PATENT ABSTRACTS OF JAPAN

(11)Publication number : **2000-031349**
(43)Date of publication of application : **28.01.2000**

(51)Int.CI. **H01L 23/29**
H01L 23/31
G01L 9/04
G01P 15/08
H01L 21/60

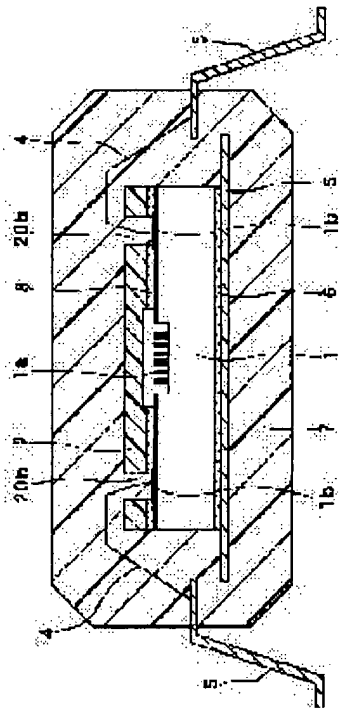
(21)Application number : **11-066948**
(22)Date of filing : **12.03.1999**

(71)Applicant : **DENSO CORP**
(72)Inventor : **YOSHIHARA SHINJI**
INOMATA SUMITOMO
ATSUMI KINYA
SAKAI MINEICHI
SHIMOYAMA YASUKI
FUJII TETSUO

(30)Priority
Priority number : **10067276** Priority date : **17.03.1998** Priority country : **JP**

(54) SEMICONDUCTOR DEVICE AND MANUFACTURE OF IT

(57)Abstract:
PROBLEM TO BE SOLVED: To eliminate the problem caused by intrusion of a cutting water at dicing, related to a semiconductor acceleration sensor comprising a protective cap.
SOLUTION: A heat-resistant resin sheet 2 is used as a protective cap which protects a beam structure body 1a formed at a semiconductor chip 1, while the heat-resistant resin sheet 2 is bonded onto the semiconductor chip 1 with a heat-resistant bonding agent 3. A polyimide base material is used as the heat-resistant resin sheet 2 while a silicon adhesive agent is used as the heat-resistant bonding agent 3. The heat-resistant resin sheet 2 is bonded onto the semiconductor chip 1 with the heat-resistant bonding agent 3 like this so that such a problem as intrusion of cutting water is avoided at dicing cut.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

MEANS

[Means for Solving the Problem] Invention according to claim 1 to 10 is accomplished in order to attain the 1st purpose of the above. In invention according to claim 1 namely, on a semiconductor chip (1) opening (20b --) for exposing the pad (1b) formed on the surface of the semiconductor chip (1) The heat-resistant-resin sheet (2 2') which has 20e is pasted up with heat-resistant adhesives (3), and it is characterized by having the thermal resistance more than the heat treatment temperature when performing wirebonding for a heat-resistant-resin sheet (2 2') and heat-resistant adhesives (3).
[0008] Thus, by pasting up on a semiconductor chip (1) using heat-resistant adhesives (3), a heat-resistant-resin sheet (2 2') It can consider as the thing of the structure where the problem of the grinding water entry at the time of a dicing cut was avoided. Moreover, since it shall have the thermal resistance more than the heat treatment temperature when performing wirebonding as a heat-resistant-resin sheet (2 2') and heat-resistant adhesives (3) The semiconductor device of the structure where wirebonding was performed with the heat-resistant-resin sheet (2 2') left can be offered.
[0009] In invention given in claims 2 and 3 like invention according to claim 1 A heat-resistant-resin sheet (2 2') is considered as the composition pasted up on the semiconductor chip (1) using heat-resistant adhesives (3). Since it shall have the thermal resistance more than the heat treatment temperature needed when carrying out the resin mould of the semiconductor chip (1) as a heat-resistant-resin sheet (2 2') and heat-resistant adhesives (3) The semiconductor device of the structure by which the resin mould was carried out, with the heat-resistant-resin sheet (2 2') left can be offered.
[0010] In invention given in claims 4 and 5 like invention according to claim 1 A heat-resistant-resin sheet (2 2') is considered as the composition pasted up on the semiconductor chip (1) using heat-resistant adhesives (3). Since it shall have the thermal resistance more than the heat treatment temperature needed when containing a semiconductor chip (1) into a package (30-33) as a heat-resistant-resin sheet (2 2') and heat-resistant adhesives (3) The semiconductor device of the structure packed with the heat-resistant-resin sheet (2 2') left can be offered.
[0011] In addition, as the above-mentioned heat-resistant-resin sheet (2 2'), like invention according to claim 6, it should be constituted using the polyimide base material and the silicone binder should be used like invention according to claim 7 as a heat-resistant binder (3). Moreover, according to invention according to claim 8 to 10, a semiconductor device which was described above can be manufactured appropriately.
[0012] Moreover, invention according to claim 11 to 20 accomplishes about the semiconductor device which has a semiconductor chip above-mentioned double-sided exposure type, and its manufacture method, in order to attain the 2nd purpose of the above. On namely, the front face of the semiconductor chip (100) which has the structure (100a) exposed to the front face and the rear face in invention according to claim 11 opening (20b --) for exposing the pad (100b) formed in the front face of this semiconductor chip The 1st heat-resistant-resin sheet (2 2') which has 20e is pasted up with heat-resistant adhesives (3). While fixing the semiconductor chip which pasted up the 2nd heat-resistant-resin sheet (102) on the rear face of this semiconductor chip, and these [1st] and the 2nd sheet pasted up on it to the leadframe (5) for carrying out wirebonding to this pad It is characterized by having the thermal resistance more than the highest temperature among the heat treatment temperature when fixing the heat treatment temperature and this semiconductor chip when performing wirebonding for the 1st and 2nd sheets and heat-resistant adhesives to this leadframe.
[0013] It can do with the thing of the structure where the problem of the grinding water entry at the time of a dicing cut was avoided by it. While being able to offer the semiconductor device of the structure where fixation in the leadframe (5) of wirebonding and a semiconductor chip (100) was performed with the 1st and 2nd heat-resistant-resin sheets (2, 2', 102) left the structure by the side of the rear face of this semiconductor chip (100a) -- this -- since this leadframe is pasted with the 2nd heat-resistant-resin sheet, adhesives are unnecessary, adhesives crawl primarily, and the problem of a riser is lost moreover, the rear face of this semiconductor chip -- this -- since it is covered with the 2nd heat-resistant-resin sheet, even when it pastes up through a leadframe and adhesives, adhesives crawl and a riser can be prevented
[0014] In invention according to claim 12 moreover, double-sided exposure type the front face and rear face of a semiconductor chip (100) It covers with the 1st heat-resistant-resin sheet (2 2') and the 2nd heat-resistant-resin sheet (102) which were pasted up with heat-resistant adhesives (3), respectively. Since it shall have the thermal resistance more than the heat treatment temperature needed in each [these] heat-resistant-resin sheet and heat-resistant adhesives when carrying out the mould of this semiconductor chip by the resin (7) this -- while being able to offer the semiconductor device of the structure by which the resin mould was carried out, with the 1st and 2nd heat-resistant-resin sheets left -- this -- with the 2nd heat-resistant-resin sheet, a resin (7) crawls and a riser can be prevented

[0015] In invention according to claim 13 moreover, double-sided exposure type the front face and rear face of a semiconductor chip (100) It covers with the 1st heat-resistant-resin sheet (2 2') and the 2nd heat-resistant-resin sheet (102) which were pasted up with heat-resistant adhesives (3), respectively. furthermore, the inside of a package (30-33) of this semiconductor chip -- containing -- this, while fixing this semiconductor chip to the interior of this package by pasting up the 2nd heat-resistant-resin sheet and this package It is characterized by having the thermal resistance more than the heat treatment temperature when fixing this semiconductor chip to this package for each [these] heat-resistant-resin sheet and each heat-resistant adhesives.
[0016] it -- this -- while being able to offer the semiconductor device of the structure packed with the 1st and 2nd heat-resistant-resin sheets left -- from the same reason as invention according to claim 11 -- this -- with the 2nd heat-resistant-resin sheet, adhesives crawl and a riser can be prevented Here, while either of the 1st and 2nd heat-resistant-resin sheets (2, 2', 102) had attached the thing which consists of a transparent material, then this sheet like invention according to claim 14, states, such as the structure (100a) in a semiconductor chip (100), can be inspected visually.
[0017] Moreover, according to invention according to claim 18, according to invention according to claim 19, the semiconductor device of a claim 11 can be manufactured appropriately, and the semiconductor device of a claim 12 can be manufactured appropriately, and according to invention according to claim 20, the semiconductor device of a claim 13 can be manufactured appropriately. In addition, the sign in the above-mentioned parenthesis shows a correspondence relation with a concrete means given in an operation form to mention later.
[0018]
[Embodiments of the Invention] (The 1st operation gestalt) The cross-section composition of the semiconductor acceleration sensor applied to the 1st operation gestalt of this invention at drawing 1 is shown. This semiconductor acceleration sensor has the structure where the resin mould of the sensor chip 1 was carried out.
[0019] The sensor chips 1 are what was indicated by JP,9-211022,A, and the thing of the same composition, the beam structure as moving part displaced in response to acceleration is formed on a silicon substrate, and they are constituted so that acceleration may be detected based on the variation rate between the movable electrode prepared in this beam structure, and the fixed electrode formed on the silicon substrate. In addition, only beam structure 1a is shown in drawing. Moreover, pad 1b for carrying out electrical connection of a movable electrode and the fixed electrode to the exterior is formed in the front face of this sensor chip 1.
[0020] The heat-resistant-resin sheet 2 is formed in the front face of the sensor chip 1 as a protective cap for protecting beam structure 1a. This heat-resistant-resin sheet 2 is pasted up after the sensor chip 1 by the heat-resistant binder 3. The heat-resistant-resin sheet 2 and the heat-resistant binder 3 have thermal resistance higher than the heat treatment temperature (for example, 150 degrees C - 180 degrees C) in the processes at the time of a resin mould etc. at the time of wirebonding mentioned later. The polyimide base material which has the thermal resistance of about 400 degrees C as a heat-resistant-resin sheet 2 can specifically be used, and the silicone binder which has the thermal resistance of about 230 degrees C as a heat-resistant binder 3 can be used.
[0021] Contact hole 20b is formed as opening for exposing pad 1b formed in the front face of the sensor chip 1 on this heat-resistant-resin sheet 2, and bonding of the pad 1b is carried out to the leadframe 5 by the wire 4. Moreover, adhesion fixation of the sensor chip 1 is carried out with the silver paste 6 on the leadframe 5, and the mould of the whole is carried out by the resin 7.
[0022] Next, the manufacture method of an acceleration sensor shown in drawing 1 is explained. The manufacturing process is shown in drawing 2 .
[Process of drawing 2 (a)] The heat-resistant pressure sensitive adhesive sheet 20 which applied the silicone binder 3 on the polyimide base material 2 is prepared. In this heat-resistant pressure sensitive adhesive sheet 20, in order to make a dicing cut at a back process easy, thickness of the polyimide base material 2 is set to 50-150 micrometers, and thickness of the silicone binder 3 is set to 10-20 micrometers.
[Process of drawing 2 (b)] Crevice 20a is prepared in the heat-resistant pressure sensitive adhesive sheet 20. This is for making it beam structure 1a not contact the heat-resistant pressure sensitive adhesive sheet 20, when sticking the heat-resistant pressure sensitive adhesive sheet 20 on the semiconductor wafer 10 in the process of drawing 2 (d). Processing of crevice 20a is performed using an excimer laser. In this case, the depth direction is controlled by the number of times of a shot. Moreover, in order to raise the throughput at the time of processing, using a mask, some laser beams are made into broadcloth, or the number of distribution or a laser oscillation machine is increased for a laser beam to several.
[0023] Moreover, contact hole 20b is opened in the position in which pad 1b of the semiconductor wafer 10 is formed. An excimer laser may be used for processing of contact hole 20b, and punching is sufficient as it. Moreover, as long as it is a size which can carry out wirebonding, even if the size of the opening is smaller than pad 1b, it may be large. In addition, it is satisfactory whichever crevice 20a and contact hole 20b process it previously.
[0024] The flat-surface composition of the heat-resistant pressure sensitive adhesive sheet 20 is shown in drawing 3 . Corresponding to the position of each sensor chip of the semiconductor wafer 10, crevice 20a and contact hole 20b are formed. Moreover, alignment key 20c is formed for alignment with the semiconductor wafer 10. This alignment key 20c is a breakthrough, and is formed using an excimer laser.
[Process of drawing 2 (c)] Next, the semiconductor wafer 10 with which beam structure 1a and pad 1b of aluminum (aluminum) were formed is prepared.
[0025] The flat-surface composition of the semiconductor wafer 10 is shown in drawing 4 . As shown in drawing, beam structure

1a is formed in the position of each sensor chip, and alignment key 1c is further formed of aluminum for alignment with the heat-resistant pressure sensitive adhesive sheet 20. In addition, pad 1b omits to this drawing 4 , and is illustrated.
[Process of drawing 2 (d)] The heat-resistant pressure sensitive adhesive sheet 20 is stuck on the front face of the semiconductor wafer 10. In this case, the heat-resistant pressure sensitive adhesive sheet 20 and the semiconductor wafer 10 are made for lamination and beam structure 1a to be settled in crevice 20a of the heat-resistant pressure sensitive adhesive sheet 20 so that alignment key 20c formed in the heat-resistant pressure sensitive adhesive sheet 20 and alignment key 1c formed in the semiconductor wafer 10 may suit.
[0026] In this lamination, in order to raise the reduction of a void and the adhesion of adhesives which are easy to generate at the time of adhesion, the heat-resistant pressure sensitive adhesive sheet 20 top is rolled with the heated roller, and it may be made to carry out by heating the heat-resistant pressure sensitive adhesive sheet 20. Moreover, the semiconductor wafer 10 is heated and you may make it roll a roller. In addition, in addition to the above-mentioned thing, the alignment of the heat-resistant pressure sensitive adhesive sheet 20 and the semiconductor wafer 10 is put in between the heat-resistant pressure sensitive adhesive sheet 20 and the semiconductor wafer 10, before pasting up a CCD camera, and it can perform alignment using a CCD camera. Moreover, after sticking depending on the case, in order to investigate whether it was certainly carried in the position or to perform a next process smoothly, width of face of the heat-resistant pressure sensitive adhesive sheet 20 is made narrower than the semiconductor wafer 10, and you may make it expose patterns, such as a scribe of the semiconductor wafer 10.
[Process of drawing 2 (e)] A dicing cut is performed along with the scribe pattern formed in the semiconductor wafer 10 on the basis of pad 1b exposed by contact hole 20b. The state where use the dicing blade 8 for drawing 5 , and the dicing cut is performed to it is shown. In addition, in drawing 2 (e), 9 shows the cutting section in which the dicing cut was carried out by the dicing blade 8.
[0027] Then, after carrying out adhesion fixation of the sensor chip 1 chip-ized by the dicing cut with the silver paste 6 on a leadframe 5 as shown in drawing 1 , and carrying out bonding of the leadframe 5 to pad 1b with a wire 4 further, a mould is carried out by the resin 7 and a semiconductor acceleration sensor is completed. When the sensor chip 1 is fixed with the silver paste 6 on a leadframe 5 in the above-mentioned manufacture method, about 150 degrees C needs to be heat-treated. Moreover, although about 150 degrees C needs to be heat-treated at the time of bonding with a wire 4 and about 180 degrees C still needs to be heat-treated at the time of a resin mould The heat-resistant temperature of the polyimide base material 2 in the heat-resistant pressure sensitive adhesive sheet 20 is about 400 degrees C, and the heat-resistant temperature of the silicone binder 3 can complete a semiconductor acceleration sensor, maintaining the configuration of the heat-resistant pressure sensitive adhesive sheet 20, since it is about 230 degrees C.
[0028] In addition, in the above-mentioned manufacture method, the pressure sensitive adhesive sheet stuck on the rear face of the semiconductor wafer 10 at the time of a dicing cut is omitted and explained.
(The 2nd operation gestalt) Although what sticks the heat-resistant pressure sensitive adhesive sheet 20 on the semiconductor wafer 10 was shown with the above-mentioned 1st operation gestalt after forming contact hole 20b in the heat-resistant pressure sensitive adhesive sheet 20, after sticking the heat-resistant pressure sensitive adhesive sheet 20 on the semiconductor wafer 10, you may form contact hole 20b.
[0029] The manufacture method of the semiconductor acceleration sensor in this case is shown in drawing 6 . First, like the 1st operation gestalt, on the polyimide base material 2, the heat-resistant pressure sensitive adhesive sheet 20 of composition of having applied the silicone binder 3 is prepared (refer to drawing 6 (a)), and crevice 20a is formed at the heat-resistant pressure sensitive adhesive sheet 20 (refer to drawing 6 (b)). Then, the heat-resistant pressure sensitive adhesive sheet 20 is stuck on the front face of the semiconductor wafer 10 (refer to drawing 6 (c)). In that case, after carrying out alignment so that beam structure 1a may be settled in crevice 20a of the heat-resistant pressure sensitive adhesive sheet 20, it pastes up.
[0030] Next, in order to carry out wirebonding, contact hole 20b is opened on pad 1b. Opening is carried out with an excimer laser. Since processing thresholds differed (selectivity is good), when aluminum is used as a material of pad 1b, and aluminum is exposed, the etch rate by the excimer laser is remarkable, and a fall or etching stops at the heat-resistant pressure sensitive adhesive sheet 20 and aluminum.
[0031] After this, like the 1st operation gestalt, a dicing cut is performed and chip-ized and the semiconductor acceleration sensor finally shown in drawing 1 is completed.
(The 3rd operation gestalt) Although the 1st and the 2nd operation gestalt showed what forms crevice 20a in the heat-resistant pressure sensitive adhesive sheet 20, a breakthrough is formed in the heat-resistant pressure sensitive adhesive sheet 20, and you may make it form a crevice.
[0032] The manufacture method of the semiconductor acceleration sensor in this case is shown in drawing 7 . First, the 1st heat-resistant pressure sensitive adhesive sheet 20 which applied the silicone binder 3 on the polyimide base material 2 is prepared. Thickness of the polyimide base material 2 is set to 50-150 micrometers, and thickness of the silicone binder 3 is set to 10-20 micrometers (refer to drawing 7 (a)). And contact hole 20d of penetration section 20c and pad 1b is prepared in the 1st heat-resistant pressure sensitive adhesive sheet 20 so that beam structure 1a of the semiconductor wafer 10 may not contact the 1st heat-resistant pressure sensitive adhesive sheet 20 (refer to drawing 7 (b)). An excimer laser or punching is sufficient as penetration section 20c and processing of contact hole 20d.
[0033] Next, the 2nd heat-resistant pressure sensitive adhesive sheet 21 of the same composition as drawing 7 (a) is prepared, on it, the 1st heat-resistant pressure sensitive adhesive sheet 20 is pasted up, it unifies, and the heat-resistant pressure sensitive adhesive sheet 22 is formed (refer to drawing 7 (c)). In this heat-resistant pressure sensitive adhesive sheet 22, the portions of the

polyimide base material 2 and the 2nd heat-resistant pressure sensitive adhesive sheet 21 become heat-resistant-resin sheet 2'. And the heat-resistant pressure sensitive adhesive sheet 22 is pasted up on the front face of the semiconductor wafer 10, and contact hole 20e is formed with an excimer laser (refer to drawing 7 (d)). Cutting which used the dicing blade may be made to perform formation of this contact hole 20e. The dicing cut of the 2nd heat-resistant pressure sensitive adhesive sheet 21 is carried out by blade width of face which specifically turns into cut width of face of the grade which does not give trouble to wirebonding.

[0034] After this, like the 1st operation gestalt, a dicing cut is performed and chip-ized and the semiconductor acceleration sensor finally shown in drawing 1 is completed. By using a breakthrough like this 3rd operation gestalt, a crevice can be easily formed in a heat-resistant-resin sheet. the [in addition, / the above-mentioned 1st or] -- although what pastes up a heat-resistant-resin sheet on a semiconductor wafer was shown using the heat-resistant pressure sensitive adhesive sheet of composition of that the heat-resistant binder was applied to the heat-resistant-resin sheet, a heat-resistant binder is applied on a heat-resistant-resin sheet or a semiconductor wafer by screen-stencil etc., and you may make it paste both up in 3 operation gestalten

(The 4th operation gestalt) In the semiconductor acceleration sensor shown in drawing 1 , although the resin mould of the sensor chip 1 is carried out, in a ceramic package, receipt fixation can be carried out and the sensor chip 1 can also be constituted.

[0035] The cross-section composition of the semiconductor acceleration sensor in that case is shown in drawing 8 . The composition of the portion of the sensor chip 1 with which beam structure 1a was protected by the heat-resistant-resin sheet 2 is the same as what is shown in drawing 1 . Receipt fixation of this sensor chip 1 is carried out into the crevice in the package book soma 30 of a ceramic. The metal wiring 31 for carrying out electrical connection to the exterior penetrates the interior in the package book soma 30, and is formed in it, and bonding of the pad 1b in the sensor chip 1 is carried out to the metal wiring 31 by the wire 4. Moreover, the covering device 32 of a ceramic is attached in the package book soma 30 by adhesives 33, and the hermetic seal of the interior of a package is carried out by this. In addition, the sensor chip 1 is being fixed in the package book soma 30 with the silver paste 34.

[0036] Thus, it sets in the semiconductor acceleration sensor of composition of that the ceramic package was carried out. When the sensor chip 1 is fixed with the silver paste 34 in the package book soma 30, about 150 degrees C needs to be heat-treated. Moreover, although about 150 degrees C needs to be heat-treated at the time of bonding with a wire 4, and about 180 degrees C needs to be heat-treated when a covering device 32 is further fixed to the ceramic book soma 30 with adhesives 33 A semiconductor acceleration sensor can be completed also in this operation gestalt, maintaining the configuration of the polyimide base material 2, since the heat-resistant temperature of the polyimide base material 2 and the silicone binder 3 is higher than the maximum temperature of the above-mentioned heat treatment temperature.

[0037] In addition, also in this operation gestalt, the manufacture method of a heat-resistant-resin sheet and its composition can apply the above-mentioned thing of the 2nd and the 3rd operation gestalt. Moreover, thermal resistance can be raised if it is the thing of the molecular structure which has a silanol group (Si-OH) as silicone adhesives. And you may use polyimide adhesives instead of a silicone binder.

[0038] Hereafter, the 5th or an octavus operation gestalt is applied to the semiconductor device which has the semiconductor chip (double-sided exposure type) which has the structure which consisted of semiconductors and exposed this invention to the front face and the rear face.

(The 5th operation gestalt) The cross-section composition of the semiconductor acceleration sensor applied to the 5th operation gestalt of this invention at drawing 9 is shown. This semiconductor acceleration sensor has the structure where the resin mould of the sensor chip 100 was carried out. In addition, in this operation gestalt and each following operation gestalt, the same-among drawing sign is given to the same portion as the above 1st - the 4th operation gestalt.

[0039] It consisted of a SOI substrate etc., the beam structure 1a shown in above-mentioned drawing 1 etc. and the beam structure 100 a which have the same composition were formed in this substrate using micro-machine technology, HOTORISO graph technology, etc., and a sensor chip 100 has exposed beam structure 100 a to a front-face [of the sensor chip 100] (upper surface in drawing 9), and rear-face side (inferior surface of tongue in drawing 9) side.

[0040] The heat-resistant-resin sheet 2 shown in above-mentioned drawing 1 etc. as a surface-protection cap for protecting beam structure 100a is formed in the front face of the sensor chip 100. This heat-resistant-resin sheet 2 is pasted up on the front face of the sensor chip 100 by the heat-resistant binder 3 shown in above-mentioned drawing 1 etc. In addition, in this operation gestalt and each following operation gestalt, the heat-resistant-resin sheet 2 is considered as the 1st heat-resistant-resin sheet 2 with the 2nd below-mentioned heat-resistant-resin sheet 102 for distinction.

[0041] Contact hole 20a is formed as opening for exposing pad 100b formed in the front face of the sensor chip 100 on the 1st heat-resistant-resin sheet 2, it gets down, and bonding of the pad 100b is carried out to the leadframe 5 by the wire 4. In addition, this pad 100b is the same as that of pad 1b shown in above-mentioned drawing 1 etc.

[0042] Moreover, the 2nd heat-resistant-resin sheet 102 is formed in the rear face of the sensor chip 100 as a rear-face protective cap for protecting beam structure 100a. This 2nd heat-resistant-resin sheet 102 demonstrates adhesive strength by making it heat and soften, and has pasted it up on the rear face of the sensor chip 100. The 2nd heat-resistant-resin sheet 102 is covered with the abbreviation whole region of the rear face of the sensor chip 100 so that beam structure 100a may be protected.

[0043] These [1st], the 2nd heat-resistant-resin sheet 2,102, and the heat-resistant adhesives 3 have the same thermal resistance as the heat-resistant-resin sheet and the heat-resistant adhesives which were stated with the above-mentioned 1st operation gestalt, and, similarly the above-mentioned polyimide base material, the above-mentioned silicone binder, or polyimide adhesives can specifically be used for them. And the sensor chip 100 is being fixed by pasting up the 2nd heat-resistant-resin sheet 102 on a leadframe 5, and the mould of the whole is carried out by the resin 7.

[0044] Here, the polyimide film adhesive which will soften if it heats, and turns into adhesives is sufficient as the 2nd heat-resistant-resin sheet 102. Next, the manufacture method of an acceleration sensor shown in drawing 9 is explained. The manufacturing process is shown in drawing 10 . These manufacture methods are the differences with using a double-sided exposure type semiconductor chip to the manufacture method of the 1st operation gestalt shown in above-mentioned drawing 2 , and main forming the heat-resistant-resin sheet 102 of a wrap 2nd for the rear-face side of this chip.
[0045] At the process of drawing 10 (a), the semiconductor wafer 110 with which beam structure 100a exposed to the front face and the rear face and pad 100b of aluminum (aluminum) were formed is prepared. The flat-surface composition of the semiconductor wafer 110 is shown in drawing 11 . As shown in drawing, beam structure 100a is formed in the position of each sensor chip, and alignment key 100c is further formed of aluminum for alignment with the heat-resistant pressure sensitive adhesive sheet 20. In addition, pad 100b omits to this drawing 11 , and is illustrated.
[0046] In the process of drawing 10 (b), that by which crevice 20a, contact hole 20b, and alignment key 20c were formed in the heat-resistant pressure sensitive adhesive sheet 20 which applied the heat-resistant adhesives 3 which consist of a silicone binder on the 1st heat-resistant-resin sheet 2 which consists of a polyimide base material obtained according to above-mentioned drawing 2 (a) and the process of (b) is stuck on the front face of the semiconductor wafer 110 in the same point as the process of above-mentioned drawing 2 (c). In this way, the 1st heat-resistant-resin sheet 2 is stuck on the front face of semiconductor wafer 110a using the heat-resistant adhesives 3.
[0047] Next, at the process of drawing 10 (c), heat the 2nd heat-resistant-resin sheet 102 which consists the rear face of the semiconductor wafer 110 of a polyimide base material which has the size of only a wrap, and it is made to soften, and sticks on the rear face of the semiconductor wafer 110. Here, since beam structure (sensing section) 100a is protected by the heat-resistant pressure sensitive adhesive sheet 20, the front face of a wafer 110 can make a wafer 110 inside-out, and can stick it easily.
[0048] Next, at the process of drawing 10 (d), a dicing cut is carried out and the semiconductor wafer 110 with which the 1st and 2nd heat-resistant-resin sheets 2,102 were stuck is chip-ized. This process can be performed in the same way as the process of above-mentioned drawing 2 (e). The state where use the dicing blade 8 for drawing 12 , and the dicing cut is performed to it is shown. Then, as the sensor chip 100 chip-ized by the dicing cut is shown in drawing 9 , heat the 2nd heat-resistant-resin sheet 102, and it is made to soften, and after carrying out bonding of pad 100b and the leadframe 5 to a leadframe 5 with a wire 4 further by carrying out adhesion fixation, a mould is carried out by the resin 7 and a semiconductor acceleration sensor is completed.
[0049] Although about 180 degrees C needs to be heat-treated, and about 150 degrees C needs to be heat-treated at the time of bonding with a wire 4 and about 180 degrees C still needs to be heat-treated in the above-mentioned manufacture method at the time of a resin mould when the sensor chip 100 is fixed on a leadframe 5 Since the heat-resistant temperature of the polyimide base material which the configuration of the heat-resistant pressure sensitive adhesive sheet 20 has been maintained, and is the 2nd heat-resistant-resin sheet 102 like the above-mentioned 1st operation gestalt is about 400 degrees C, A semiconductor acceleration sensor can be completed with the configuration of the heat-resistant-resin sheet 102 maintained.
[0050] Moreover, in this operation gestalt, since the leadframe 5 is pasted with the 2nd heat-resistant-resin sheet 102, in case structure 100a by the side of the rear face of the sensor chip 100 carries out die mounting of the chip 100 at a leadframe 5, its adhesives are unnecessary, adhesives crawl on it, and the problem of a riser of it is lost. Moreover, by mediation of the 2nd heat-resistant-resin sheet 102, a resin 7 can adhere to beam structure 100a from the rear face of a chip 100 in the case of a resin mould, or it can prevent invading from the crevice for jointing between the rear faces of a chip 100, and creeping up to beam structure 100a.
[0051] Moreover, in this operation gestalt, since the polyimide base material is used as a heat-resistant-resin sheet 2,102 and a polyimide base material has transparency, each sheet 2,102 is spaced, the movable electrode and fixed electrode of beam structure 100a can be checked, and a visual inspection becomes possible in the state [having attached the sheet, i.e., a protective cap,].
(The 6th operation gestalt) The another manufacture method of the semiconductor acceleration sensor shown in above-mentioned drawing 9 is shown in drawing 13 . These manufacture methods are the differences with using a double-sided exposure type semiconductor chip to the manufacture method (referring to drawing 6) shown in the above-mentioned 2nd operation gestalt, and main forming the heat-resistant-resin sheet 102 of a wrap 2nd for the rear-face side of this chip.
[0052] First, at the process of drawing 13 (a), the heat-resistant pressure sensitive adhesive sheet 20 in which crevice 20a obtained according to above-mentioned drawing 6 (a) and the process of (b) was formed is stuck on the front face of the semiconductor wafer 110. The point is the same as that of the process of above-mentioned drawing 6 (c). Next, at the process of drawing 13 (b), like above-mentioned drawing 6 (d), in order to carry out wirebonding, contact hole 20b is opened on pad 100b.
[0053] Next, at the process of drawing 13 (c), the 2nd heat-resistant-resin sheet 102 is stuck on the rear face of the semiconductor wafer 100 like the process of drawing 10 (c) stated with the above-mentioned 5th operation gestalt. After this, like the 5th operation gestalt, a dicing cut is performed and chip-ized and the semiconductor acceleration sensor finally shown in drawing 9 is completed. Also in this operation gestalt, the same effect as the above-mentioned 5th operation gestalt is done so.
(The 7th operation gestalt) the [of the semiconductor acceleration sensor shown in drawing 9 / the above 5th and] -- 6 operation gestalten show the different manufacture method to drawing 14 These manufacture methods are the differences with using a double-sided exposure type semiconductor chip to the manufacture method (referring to drawing 7) shown in the above-mentioned 3rd operation gestalt, and main forming the heat-resistant-resin sheet 102 of a wrap 2nd for the rear-face side of this chip.
[0054] First, at the process of drawing 14 (a), the heat-resistant pressure sensitive adhesive sheet 22 obtained according to the

process of above-mentioned drawing 7 (a), (b), and (c) is stuck on the front face of the semiconductor wafer 110. The point is the same as that of the process of above-mentioned drawing 7 (d). In addition, heat-resistant-resin sheet 2' in the heat-resistant pressure sensitive adhesive sheet 22 is equivalent to 1st heat-resistant-resin sheet 2' with this operation gestalt.

[0055] Next, at the process of drawing 14 (b), the 2nd heat-resistant-resin sheet 102 is stuck on the rear face of the semiconductor wafer 100 like the process of drawing 10 (c) stated with the above-mentioned 5th operation gestalt. After this, like the 5th operation gestalt, a dicing cut is performed and chip-ized (refer to drawing 14 (c)), and the semiconductor acceleration sensor finally shown in drawing 9 is completed. Also in this operation gestalt, the same effect as the above-mentioned 5th operation gestalt is done so.

(Octavus operation gestalt) This operation gestalt is the modification which is not a resin mould, carried out receipt fixation of the sensor chip 100 in the semiconductor acceleration sensor shown in drawing 9 into the ceramic package, constituted, and applied the double-sided exposure type sensor chip 100 to the above-mentioned 4th operation gestalt. The cross-section composition of the semiconductor acceleration sensor of this operation gestalt is shown in drawing 15 .

[0056] The composition of the portion of the sensor chip 100 with which beam structure 100a was protected by the 1st and 2nd heat-resistant-resin sheets 2,102 is the same as what is shown in above-mentioned drawing 9 . The sensor chip 100 is contained in the crevice in the package book soma 30, and is being fixed by pasting up the internal surface of this crevice, and the 2nd heat-resistant-resin sheet 102.

[0057] Thus, it sets in the semiconductor acceleration sensor of composition of that the ceramic package was carried out. When the sensor chip 100 is fixed in the package book soma 30, about 180 degrees C needs to be heat-treated. Moreover, although about 150 degrees C needs to be heat-treated at the time of bonding with a wire 4, and about 180 degrees C needs to be heat-treated when a covering device 32 is further fixed to the ceramic book soma 30 with adhesives 33 Since the heat-resistant temperature of the polyimide base material which is the heat-resistant-resin sheet 2,102, and the silicone binder which is the heat-resistant adhesives 3 is higher than the maximum temperature of the above-mentioned heat treatment temperature also in this operation form, A semiconductor acceleration sensor can be completed with the configuration of both the heat-resistant-resins sheet 2,102 maintained.

[0058] And also in this operation form, with the 2nd heat-resistant-resin sheet 102, adhesives crawl and the problem of a riser is lost. In addition, also in this operation form, the manufacture method of a heat-resistant-resin sheet and its composition can apply the above-mentioned thing of the 6th and the 7th operation form. Moreover, thermal resistance can be raised if it is the thing of the molecular structure which has a silanol group (Si-OH) as silicone adhesives. And you may use polyimide adhesives instead of a silicone binder.

[0059] Moreover, you may paste up the 2nd heat-resistant adhesives 102 on the rear face of the semiconductor wafer 110 with the same heat-resistant adhesives as the heat-resistant adhesives 3. Moreover, you may also perform adhesion with the crevice in the 2nd heat-resistant-resin sheet 102, leadframe 5, and package book soma 30 through heat-resistant adhesives. in this case, these heat-resistant adhesives -- creeping up -- it can prevent by mediation of the 2nd heat-resistant-resin sheet 102

[0060] Furthermore, a mechanical strength can apply this invention similarly to the semiconductor device which has the low structure not only like a sensor element but like the air bridge wiring structure of having moving part, such as the beam structure.

[Translation done.]

* NOTICES *

PRIOR ART

[Description of the Prior Art] Conventionally, in the amount sensors of semiconductor dynamics, such as a semiconductor acceleration sensor and a semiconductor pressure sensor, moving part is formed in a silicon chip, physical quantity, such as acceleration and a pressure, is changed into an electrical signal with the variation rate of moving part, and it takes out. For example, the acceleration sensor to which the beam structure as moving part displaced in response to acceleration detects acceleration based on the variation rate between the movable electrode which was formed on the silicon substrate and prepared in the beam structure, and the fixed electrode which countered the movable electrode and was formed on the silicon substrate is indicated by JP,9-211022,A.

[Translation done.]

* NOTICES *

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In such a semiconductor device, in order to protect moving part, covering moving part by the protective cap is performed. As this protective cap, there is a thing using a glass substrate as indicated by JP,6-347475,A. In this case, a glass substrate is joined by the anode plate conjugation method on a semiconductor wafer. When a glass substrate is used as a protective cap, if a crevice is made by the surface roughness of a plane of composition etc. in the joint between a semiconductor wafer and a glass substrate, grinding water will invade from the crevice at the time of a dicing cut, and the problem of moving part stopping moving with the surface tension of water etc. will occur.

[0004] Moreover, what uses not a glass substrate but UV hardenability sheet as a protective cap is indicated by JP,9-27466,A. Although the problem of the grinding water entry at the time of a dicing cut will be avoided if this UV hardenability sheet is used, UV hardenability sheet needs to remove UV hardenability sheet by back processes, such as wirebonding which needs temperature higher than it, in order for a configuration to change at the temperature of about 80-90 degrees C. For this reason, there is a problem that the number of processes increases.

[0005] It sets it as the 1st purpose that this invention solves the above-mentioned problem. Furthermore, not only the front face of a chip but the structure (double-sided exposure type) exposed also from a rear face has the beam structure (moving part) which is the sensing section. In such sensor structure, when carrying out die mounting of the chip at a leadframe, or in case it contains a chip in a package and fixes with adhesives, the adhesives for pasting up a chip, a leadframe, or a package creep up from the rear face of a chip to the sensing section (moving part), and the problem of the sensing section stopping moving occurs.

[0006] Moreover, in the structure which carries out the resin mould of the chip above-mentioned double-sided exposure type, a resin adheres to the sensing section, and even if it is the structure which carries out the resin mould of the chip of the above-mentioned double-sided exposure type pasted up on the leadframe or the package, there is a possibility that a resin may creep up from the crevice for jointing between the rear faces of a chip to the sensing section. this invention sets it as the 2nd purpose for the above-mentioned adhesives or a mould resin to crawl, and to prevent a riser in the semiconductor device which uses a double-sided exposure type chip, attaining the 1st purpose of the above.

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the cross-section block diagram of the semiconductor acceleration sensor in which the 1st operation gestalt of this invention is shown.
[Drawing 2] It is process drawing showing the manufacture method of the semiconductor acceleration sensor shown in drawing 1.
[Drawing 3] It is drawing showing the flat-surface composition of the heat-resistant pressure sensitive adhesive sheet 20.
[Drawing 4] It is drawing showing the flat-surface composition of the semiconductor wafer 10.
[Drawing 5] It is drawing showing the state where the dicing cut is performed using the dicing blade 8.
[Drawing 6] It is process drawing showing the manufacture method of the semiconductor acceleration sensor concerning the 2nd operation gestalt of this invention.
[Drawing 7] It is process drawing showing the manufacture method of the semiconductor acceleration sensor concerning the 3rd operation gestalt of this invention.
[Drawing 8] It is the cross-section block diagram of the semiconductor acceleration sensor in which the 4th operation gestalt of this invention is shown.
[Drawing 9] It is the cross-section block diagram of the semiconductor acceleration sensor in which the 5th operation gestalt of this invention is shown.
[Drawing 10] It is process drawing showing the manufacture method of the semiconductor acceleration sensor shown in drawing 9.
[Drawing 11] It is drawing showing the flat-surface composition of the semiconductor wafer 110.
[Drawing 12] It is drawing showing the state where the semiconductor wafer 110 with which the 1st and 2nd heat-resistant-resin sheets 2,102 were stuck is cut using the dicing blade 8.
[Drawing 13] It is process drawing showing the manufacture method of the semiconductor acceleration sensor concerning the 6th operation gestalt of this invention.
[Drawing 14] It is process drawing showing the manufacture method of the semiconductor acceleration sensor concerning the 7th operation gestalt of this invention.
[Drawing 15] It is the cross-section block diagram of the semiconductor acceleration sensor in which the octavus operation gestalt of this invention is shown.
[Description of Notations]
1,100 -- -- the sensor chip, 1a, and 100a-- beam structure, 2 -- heat-resistant-resin sheet, and 3 -- -- a heat-resistant binder, 4 -- wire, 5 -- leadframe, and 6 -- -- a silver paste, 7 -- resin, 20 -- thermal-resistance pressure sensitive adhesive sheet, and 20a-- -- a crevice, 20b, and 100b-- contact hole, 30 -- package book soma, and 31 -- -- metal wiring, 32 -- covering device, 33 -- adhesives, and 102 -- -- the 2nd heat-resistant-resin

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the semiconductor device with which it comes to cover the structure by the protective cap, and its manufacture method in the semiconductor chip which has the structure which consisted of semiconductors.
[0002]
[Description of the Prior Art] Conventionally, in the amount sensors of semiconductor dynamics, such as a semiconductor acceleration sensor and a semiconductor pressure sensor, moving part is formed in a silicon chip, physical quantity, such as acceleration and a pressure, is changed into an electrical signal with the variation rate of moving part, and it takes out. For example, the acceleration sensor to which the beam structure as moving part displaced in response to acceleration detects acceleration based on the variation rate between the movable electrode which was formed on the silicon substrate and prepared in the beam structure, and the fixed electrode which countered the movable electrode and was formed on the silicon substrate is indicated by JP,9-211022,A.
[0003]
[Problem(s) to be Solved by the Invention] In such a semiconductor device, in order to protect moving part, covering moving part by the protective cap is performed. As this protective cap, there is a thing using a glass substrate as indicated by JP,6-347475,A. In this case, a glass substrate is joined by the anode plate conjugation method on a semiconductor wafer. When a glass substrate is used as a protective cap, if a crevice is made by the surface roughness of a plane of composition etc. in the joint between a semiconductor wafer and a glass substrate, grinding water will invade from the crevice at the time of a dicing cut, and the problem of moving part stopping moving with the surface tension of water etc. will occur.
[0004] Moreover, what uses not a glass substrate but UV hardenability sheet as a protective cap is indicated by JP,9-27466,A. Although the problem of the grinding water entry at the time of a dicing cut will be avoided if this UV hardenability sheet is used, UV hardenability sheet needs to remove UV hardenability sheet by back processes, such as wirebonding which needs temperature higher than it, in order for a configuration to change at the temperature of about 80-90 degrees C. For this reason, there is a problem that the number of processes increases.
[0005] It sets it as the 1st purpose that this invention solves the above-mentioned problem. Furthermore, not only the front face of a chip but the structure (double-sided exposure type) exposed also from a rear face has the beam structure (moving part) which is the sensing section. In such sensor structure, when carrying out die mounting of the chip at a leadframe, or in case it contains a chip in a package and fixes with adhesives, the adhesives for pasting up a chip, a leadframe, or a package creep up from the rear face of a chip to the sensing section (moving part), and the problem of the sensing section stopping moving occurs.
[0006] Moreover, in the structure which carries out the resin mould of the chip above-mentioned double-sided exposure type, a resin adheres to the sensing section, and even if it is the structure which carries out the resin mould of the chip of the above-mentioned double-sided exposure type pasted up on the leadframe or the package, there is a possibility that a resin may creep up from the crevice for jointing between the rear faces of a chip to the sensing section. this invention sets it as the 2nd purpose for the above-mentioned adhesives or a mould resin to crawl, and to prevent a riser in the semiconductor device which uses a double-sided exposure type chip, attaining the 1st purpose of the above.
[0007]
[Means for Solving the Problem] Invention according to claim 1 to 10 is accomplished in order to attain the 1st purpose of the above. In invention according to claim 1 namely, on a semiconductor chip (1) opening (20b --) for exposing the pad (1b) formed on the surface of the semiconductor chip (1) The heat-resistant-resin sheet (2 2') which has 20e is pasted up with heat-resistant adhesives (3), and it is characterized by having the thermal resistance more than the heat treatment temperature when performing wirebonding for a heat-resistant-resin sheet (2 2') and heat-resistant adhesives (3).
[0008] Thus, by pasting up on a semiconductor chip (1) using heat-resistant adhesives (3), a heat-resistant-resin sheet (2 2') It can consider as the thing of the structure where the problem of the grinding water entry at the time of a dicing cut was avoided. Moreover, since it shall have the thermal resistance more than the heat treatment temperature when performing wirebonding as a heat-resistant-resin sheet (2 2') and heat-resistant adhesives (3) The semiconductor device of the structure where wirebonding was performed with the heat-resistant-resin sheet (2 2') left can be offered.
[0009] In invention given in claims 2 and 3 like invention according to claim 1 A heat-resistant-resin sheet (2 2') is considered as

the composition pasted up on the semiconductor chip (1) using heat-resistant adhesives (3). Since it shall have the thermal resistance more than the heat treatment temperature needed when carrying out the resin mould of the semiconductor chip (1) as a heat-resistant-resin sheet (2 2') and heat-resistant adhesives (3) The semiconductor device of the structure by which the resin mould was carried out, with the heat-resistant-resin sheet (2 2') left can be offered.
[0010] In invention given in claims 4 and 5 like invention according to claim 1 A heat-resistant-resin sheet (2 2') is considered as the composition pasted up on the semiconductor chip (1) using heat-resistant adhesives (3). Since it shall have the thermal resistance more than the heat treatment temperature needed when containing a semiconductor chip (1) into a package (30-33) as a heat-resistant-resin sheet (2 2') and heat-resistant adhesives (3) The semiconductor device of the structure packed with the heat-resistant-resin sheet (2 2') left can be offered.
[0011] In addition, as the above-mentioned heat-resistant-resin sheet (2 2'), like invention according to claim 6, it should be constituted using the polyimide base material and the silicone binder should be used like invention according to claim 7 as a heat-resistant binder (3). Moreover, according to invention according to claim 8 to 10, a semiconductor device which was described above can be manufactured appropriately.
[0012] Moreover, invention according to claim 11 to 20 accomplishes about the semiconductor device which has a semiconductor chip above-mentioned double-sided exposure type, and its manufacture method, in order to attain the 2nd purpose of the above. On namely, the front face of the semiconductor chip (100) which has the structure (100a) exposed to the front face and the rear face in invention according to claim 11 opening (20b --) for exposing the pad (100b) formed in the front face of this semiconductor chip The 1st heat-resistant-resin sheet (2 2') which has 20e is pasted up with heat-resistant adhesives (3). While fixing the semiconductor chip which pasted up the 2nd heat-resistant-resin sheet (102) on the rear face of this semiconductor chip, and these [1st] and the 2nd sheet pasted up on it to the leadframe (5) for carrying out wirebonding to this pad It is characterized by having the thermal resistance more than the highest temperature among the heat treatment temperature when fixing the heat treatment temperature and this semiconductor chip when performing wirebonding for the 1st and 2nd sheets and heat-resistant adhesives to this leadframe.
[0013] It can do with the thing of the structure where the problem of the grinding water entry at the time of a dicing cut was avoided by it. While being able to offer the semiconductor device of the structure where fixation in the leadframe (5) of wirebonding and a semiconductor chip (100) was performed with the 1st and 2nd heat-resistant-resin sheets (2, 2', 102) left the structure by the side of the rear face of this semiconductor chip (100a) -- this -- since this leadframe is pasted with the 2nd heat-resistant-resin sheet, adhesives are unnecessary, adhesives crawl primarily, and the problem of a riser is lost moreover, the rear face of this semiconductor chip -- this -- since it is covered with the 2nd heat-resistant-resin sheet, even when it pastes up through a leadframe and adhesives, adhesives crawl and a riser can be prevented
[0014] In invention according to claim 12 moreover, double-sided exposure type the front face and rear face of a semiconductor chip (100) It covers with the 1st heat-resistant-resin sheet (2 2') and the 2nd heat-resistant-resin sheet (102) which were pasted up with heat-resistant adhesives (3), respectively. Since it shall have the thermal resistance more than the heat treatment temperature needed in each [these] heat-resistant-resin sheet and heat-resistant adhesives when carrying out the mould of this semiconductor chip by the resin (7) this -- while being able to offer the semiconductor device of the structure by which the resin mould was carried out, with the 1st and 2nd heat-resistant-resin sheets left -- this -- with the 2nd heat-resistant-resin sheet, a resin (7) crawls and a riser can be prevented
[0015] In invention according to claim 13 moreover, double-sided exposure type the front face and rear face of a semiconductor chip (100) It covers with the 1st heat-resistant-resin sheet (2 2') and the 2nd heat-resistant-resin sheet (102) which were pasted up with heat-resistant adhesives (3), respectively. furthermore, the inside of a package (30-33) of this semiconductor chip -- containing -- this, while fixing this semiconductor chip to the interior of this package by pasting up the 2nd heat-resistant-resin sheet and this package It is characterized by having the thermal resistance more than the heat treatment temperature when fixing this semiconductor chip to this package for each [these] heat-resistant-resin sheet and each heat-resistant adhesives.
[0016] it -- this -- while being able to offer the semiconductor device of the structure packed with the 1st and 2nd heat-resistant-resin sheets left -- from the same reason as invention according to claim 11 -- this -- with the 2nd heat-resistant-resin sheet, adhesives crawl and a riser can be prevented Here, while either of the 1st and 2nd heat-resistant-resin sheets (2, 2', 102) had attached the thing which consists of a transparent material, then this sheet like invention according to claim 14, states, such as the structure (100a) in a semiconductor chip (100), can be inspected visually.
[0017] Moreover, according to invention according to claim 18, according to invention according to claim 19, the semiconductor device of a claim 11 can be manufactured appropriately, and the semiconductor device of a claim 12 can be manufactured appropriately, and according to invention according to claim 20, the semiconductor device of a claim 13 can be manufactured appropriately. In addition, the sign in the above-mentioned parenthesis shows a correspondence relation with a concrete means given in an operation gestalt to mention later.
[0018]
[Embodiments of the Invention] (The 1st operation gestalt) The cross-section composition of the semiconductor acceleration sensor applied to the 1st operation gestalt of this invention at drawing 1 is shown. This semiconductor acceleration sensor has the structure where the resin mould of the sensor chip 1 was carried out.
[0019] The sensor chips 1 are what was indicated by JP,9-211022,A, and the thing of the same composition, the beam structure as moving part displaced in response to acceleration is formed on a silicon substrate, and they are constituted so that acceleration may be detected based on the variation rate between the movable electrode prepared in this beam structure, and the fixed

electrode formed on the silicon substrate. In addition, only beam structure 1a is shown in drawing. Moreover, pad 1b for carrying out electrical connection of a movable electrode and the fixed electrode to the exterior is formed in the front face of this sensor chip 1.

[0020] The heat-resistant-resin sheet 2 is formed in the front face of the sensor chip 1 as a protective cap for protecting beam structure 1a. This heat-resistant-resin sheet 2 is pasted up after the sensor chip 1 by the heat-resistant binder 3. The heat-resistant-resin sheet 2 and the heat-resistant binder 3 have thermal resistance higher than the heat treatment temperature (for example, 150 degrees C - 180 degrees C) in the processes at the time of a resin mould etc. at the time of wirebonding mentioned later. The polyimide base material which has the thermal resistance of about 400 degrees C as a heat-resistant-resin sheet 2 can specifically be used, and the silicone binder which has the thermal resistance of about 230 degrees C as a heat-resistant binder 3 can be used.

[0021] Contact hole 20b is formed as opening for exposing pad 1b formed in the front face of the sensor chip 1 on this heat-resistant-resin sheet 2, and bonding of the pad 1b is carried out to the leadframe 5 by the wire 4. Moreover, adhesion fixation of the sensor chip 1 is carried out with the silver paste 6 on the leadframe 5, and the mould of the whole is carried out by the resin 7.

[0022] Next, the manufacture method of an acceleration sensor shown in drawing 1 is explained. The manufacturing process is shown in drawing 2 .

[Process of drawing 2 (a)] The heat-resistant pressure sensitive adhesive sheet 20 which applied the silicone binder 3 on the polyimide base material 2 is prepared. In this heat-resistant pressure sensitive adhesive sheet 20, in order to make a dicing cut at a back process easy, thickness of the polyimide base material 2 is set to 50-150 micrometers, and thickness of the silicone binder 3 is set to 10-20 micrometers.

[Process of drawing 2 (b)] Crevice 20a is prepared in the heat-resistant pressure sensitive adhesive sheet 20. This is for making it beam structure 1a not contact the heat-resistant pressure sensitive adhesive sheet 20, when sticking the heat-resistant pressure sensitive adhesive sheet 20 on the semiconductor wafer 10 in the process of drawing 2 (d). Processing of crevice 20a is performed using an excimer laser. In this case, the depth direction is controlled by the number of times of a shot. Moreover, in order to raise the throughput at the time of processing, using a mask, some laser beams are made into broadcloth, or the number of distribution or a laser oscillation machine is increased for a laser beam to several.

[0023] Moreover, contact hole 20b is opened in the position in which pad 1b of the semiconductor wafer 10 is formed. An excimer laser may be used for processing of contact hole 20b, and punching is sufficient as it. Moreover, as long as it is a size which can carry out wirebonding, even if the size of the opening is smaller than pad 1b, it may be large. In addition, it is satisfactory whichever crevice 20a and contact hole 20b process it previously.

[0024] The flat-surface composition of the heat-resistant pressure sensitive adhesive sheet 20 is shown in drawing 3 . Corresponding to the position of each sensor chip of the semiconductor wafer 10, crevice 20a and contact hole 20b are formed. Moreover, alignment key 20c is formed for alignment with the semiconductor wafer 10. This alignment key 20c is a breakthrough, and is formed using an excimer laser.

[Process of drawing 2 (c)] Next, the semiconductor wafer 10 with which beam structure 1a and pad 1b of aluminum (aluminum) were formed is prepared.

[0025] The flat-surface composition of the semiconductor wafer 10 is shown in drawing 4 . As shown in drawing, beam structure 1a is formed in the position of each sensor chip, and alignment key 1c is further formed of aluminum for alignment with the heat-resistant pressure sensitive adhesive sheet 20. In addition, pad 1b omits to this drawing 4 , and is illustrated.

[Process of drawing 2 (d)] The heat-resistant pressure sensitive adhesive sheet 20 is stuck on the front face of the semiconductor wafer 10. In this case, the heat-resistant pressure sensitive adhesive sheet 20 and the semiconductor wafer 10 are made for lamination and beam structure 1a to be settled in crevice 20a of the heat-resistant pressure sensitive adhesive sheet 20 so that alignment key 20c formed in the heat-resistant pressure sensitive adhesive sheet 20 and alignment key 1c formed in the semiconductor wafer 10 may suit.

[0026] In this lamination, in order to raise the reduction of a void and the adhesion of adhesives which are easy to generate at the time of adhesion, the heat-resistant pressure sensitive adhesive sheet 20 top is rolled with the heated roller, and it may be made to carry out by heating the heat-resistant pressure sensitive adhesive sheet 20. Moreover, the semiconductor wafer 10 is heated and you may make it roll a roller. In addition, in addition to the above-mentioned thing, the alignment of the heat-resistant pressure sensitive adhesive sheet 20 and the semiconductor wafer 10 is put in between the heat-resistant pressure sensitive adhesive sheet 20 and the semiconductor wafer 10, before pasting up a CCD camera, and it can perform alignment using a CCD camera. Moreover, after sticking depending on the case, in order to investigate whether it was certainly carried in the position or to perform a next process smoothly, width of face of the heat-resistant pressure sensitive adhesive sheet 20 is made narrower than the semiconductor wafer 10, and you may make it expose patterns, such as a scribe of the semiconductor wafer 10.

[Process of drawing 2 (e)] A dicing cut is performed along with the scribe pattern formed in the semiconductor wafer 10 on the basis of pad 1b exposed by contact hole 20b. The state where use the dicing blade 8 for drawing 5 , and the dicing cut is performed to it is shown. In addition, in drawing 2 (e), 9 shows the cutting section in which the dicing cut was carried out by the dicing blade 8.

[0027] Then, after carrying out adhesion fixation of the sensor chip 1 chip-ized by the dicing cut with the silver paste 6 on a leadframe 5 as shown in drawing 1 , and carrying out bonding of the leadframe 5 to pad 1b with a wire 4 further, a mould is carried out by the resin 7 and a semiconductor acceleration sensor is completed. When the sensor chip 1 is fixed with the silver

paste 6 on a leadframe 5 in the above-mentioned manufacture method, about 150 degrees C needs to be heat-treated. Moreover, although about 150 degrees C needs to be heat-treated at the time of bonding with a wire 4 and about 180 degrees C still needs to be heat-treated at the time of a resin mould The heat-resistant temperature of the polyimide base material 2 in the heat-resistant pressure sensitive adhesive sheet 20 is about 400 degrees C, and the heat-resistant temperature of the silicone binder 3 can complete a semiconductor acceleration sensor, maintaining the configuration of the heat-resistant pressure sensitive adhesive sheet 20, since it is about 230 degrees C.

[0028] In addition, in the above-mentioned manufacture method, the pressure sensitive adhesive sheet stuck on the rear face of the semiconductor wafer 10 at the time of a dicing cut is omitted and explained.

(The 2nd operation gestalt) Although what sticks the heat-resistant pressure sensitive adhesive sheet 20 on the semiconductor wafer 10 was shown with the above-mentioned 1st operation gestalt after forming contact hole 20b in the heat-resistant pressure sensitive adhesive sheet 20, after sticking the heat-resistant pressure sensitive adhesive sheet 20 on the semiconductor wafer 10, you may form contact hole 20b.

[0029] The manufacture method of the semiconductor acceleration sensor in this case is shown in drawing 6 . First, like the 1st operation gestalt, on the polyimide base material 2, the heat-resistant pressure sensitive adhesive sheet 20 of composition of having applied the silicone binder 3 is prepared (refer to drawing 6 (a)), and crevice 20a is formed at the heat-resistant pressure sensitive adhesive sheet 20 (refer to drawing 6 (b)). Then, the heat-resistant pressure sensitive adhesive sheet 20 is stuck on the front face of the semiconductor wafer 10 (refer to drawing 6 (c)). In that case, after carrying out alignment so that beam structure 1a may be settled in crevice 20a of the heat-resistant pressure sensitive adhesive sheet 20, it pastes up.

[0030] Next, in order to carry out wirebonding, contact hole 20b is opened on pad 1b. Opening is carried out with an excimer laser. Since processing thresholds differed (selectivity is good), when aluminum is used as a material of pad 1b, and aluminum is exposed, the etch rate by the excimer laser is remarkable, and a fall or etching stops at the heat-resistant pressure sensitive adhesive sheet 20 and aluminum.

[0031] After this, like the 1st operation gestalt, a dicing cut is performed and chip-ized and the semiconductor acceleration sensor finally shown in drawing 1 is completed.

(The 3rd operation gestalt) Although the 1st and the 2nd operation gestalt showed what forms crevice 20a in the heat-resistant pressure sensitive adhesive sheet 20, a breakthrough is formed in the heat-resistant pressure sensitive adhesive sheet 20, and you may make it form a crevice.

[0032] The manufacture method of the semiconductor acceleration sensor in this case is shown in drawing 7 . First, the 1st heat-resistant pressure sensitive adhesive sheet 20 which applied the silicone binder 3 on the polyimide base material 2 is prepared. Thickness of the polyimide base material 2 is set to 50-150 micrometers, and thickness of the silicone binder 3 is set to 10-20 micrometers (refer to drawing 7 (a)). And contact hole 20d of penetration section 20c and pad 1b is prepared in the 1st heat-resistant pressure sensitive adhesive sheet 20 so that beam structure 1a of the semiconductor wafer 10 may not contact the 1st heat-resistant pressure sensitive adhesive sheet 20 (refer to drawing 7 (b)). An excimer laser or punching is sufficient as penetration section 20c and processing of contact hole 20d.

[0033] Next, the 2nd heat-resistant pressure sensitive adhesive sheet 21 of the same composition as drawing 7 (a) is prepared, on it, the 1st heat-resistant pressure sensitive adhesive sheet 20 is pasted up, it unifies, and the heat-resistant pressure sensitive adhesive sheet 22 is formed (refer to drawing 7 (c)). In this heat-resistant pressure sensitive adhesive sheet 22, the portions of the polyimide base material 2 and the 2nd heat-resistant pressure sensitive adhesive sheet 21 become heat-resistant-resin sheet 2'. And the heat-resistant pressure sensitive adhesive sheet 22 is pasted up on the front face of the semiconductor wafer 10, and contact hole 20e is formed with an excimer laser (refer to drawing 7 (d)). Cutting which used the dicing blade may be made to perform formation of this contact hole 20e. The dicing cut of the 2nd heat-resistant pressure sensitive adhesive sheet 21 is carried out by blade width of face which specifically turns into cut width of face of the grade which does not give trouble to wirebonding.

[0034] After this, like the 1st operation gestalt, a dicing cut is performed and chip-ized and the semiconductor acceleration sensor finally shown in drawing 1 is completed. By using a breakthrough like this 3rd operation gestalt, a crevice can be easily formed in a heat-resistant-resin sheet. the [in addition, / the above-mentioned 1st or] -- although what pastes up a heat-resistant-resin sheet on a semiconductor wafer was shown using the heat-resistant pressure sensitive adhesive sheet of composition of that the heat-resistant binder was applied to the heat-resistant-resin sheet, a heat-resistant binder is applied on a heat-resistant-resin sheet or a semiconductor wafer by screen-stencil etc., and you may make it paste both up in 3 operation gestalten

(The 4th operation gestalt) In the semiconductor acceleration sensor shown in drawing 1 , although the resin mould of the sensor chip 1 is carried out, in a ceramic package, receipt fixation can be carried out and the sensor chip 1 can also be constituted.

[0035] The cross-section composition of the semiconductor acceleration sensor in that case is shown in drawing 8 . The composition of the portion of the sensor chip 1 with which beam structure 1a was protected by the heat-resistant-resin sheet 2 is the same as what is shown in drawing 1 . Receipt fixation of this sensor chip 1 is carried out into the crevice in the package book soma 30 of a ceramic. The metal wiring 31 for carrying out electrical connection to the exterior penetrates the interior in the package book soma 30, and is formed in it, and bonding of the pad 1b in the sensor chip 1 is carried out to the metal wiring 31 by the wire 4. Moreover, the covering device 32 of a ceramic is attached in the package book soma 30 by adhesives 33, and the hermetic seal of the interior of a package is carried out by this. In addition, the sensor chip 1 is being fixed in the package book soma 30 with the silver paste 34.

[0036] Thus, it sets in the semiconductor acceleration sensor of composition of that the ceramic package was carried out. When the sensor chip 1 is fixed with the silver paste 34 in the package book soma 30, about 150 degrees C needs to be heat-treated.

Moreover, although about 150 degrees C needs to be heat-treated at the time of bonding with a wire 4, and about 180 degrees C needs to be heat-treated when a covering device 32 is further fixed to the ceramic book soma 30 with adhesives 33 A semiconductor acceleration sensor can be completed also in this operation gestalt, maintaining the configuration of the polyimide base material 2, since the heat-resistant temperature of the polyimide base material 2 and the silicone binder 3 is higher than the maximum temperature of the above-mentioned heat treatment temperature.

[0037] In addition, also in this operation gestalt, the manufacture method of a heat-resistant-resin sheet and its composition can apply the above-mentioned thing of the 2nd and the 3rd operation gestalt. Moreover, thermal resistance can be raised if it is the thing of the molecular structure which has a silanol group (Si-OH) as silicone adhesives. And you may use polyimide adhesives instead of a silicone binder.

[0038] Hereafter, the 5th or an octavus operation gestalt is applied to the semiconductor device which has the semiconductor chip (double-sided exposure type) which has the structure which consisted of semiconductors and exposed this invention to the front face and the rear face.

(The 5th operation gestalt) The cross-section composition of the semiconductor acceleration sensor applied to the 5th operation gestalt of this invention at drawing 9 is shown. This semiconductor acceleration sensor has the structure where the resin mould of the sensor chip 100 was carried out. In addition, in this operation gestalt and each following operation gestalt, the same-among drawing sign is given to the same portion as the above 1st - the 4th operation gestalt.

[0039] It consisted of a SOI substrate etc., the beam structure 1a shown in above-mentioned drawing 1 etc. and the beam structure 100 a which have the same composition were formed in this substrate using micro-machine technology, HOTORISO graph technology, etc., and a sensor chip 100 has exposed beam structure 100 a to a front-face [of the sensor chip 100] (upper surface in drawing 9), and rear-face side (inferior surface of tongue in drawing 9) side.

[0040] The heat-resistant-resin sheet 2 shown in above-mentioned drawing 1 etc. as a surface-protection cap for protecting beam structure 100a is formed in the front face of the sensor chip 100. This heat-resistant-resin sheet 2 is pasted up on the front face of the sensor chip 100 by the heat-resistant binder 3 shown in above-mentioned drawing 1 etc. In addition, in this operation gestalt and each following operation gestalt, the heat-resistant-resin sheet 2 is considered as the 1st heat-resistant-resin sheet 2 with the 2nd below-mentioned heat-resistant-resin sheet 102 for distinction.

[0041] Contact hole 20a is formed as opening for exposing pad 100b formed in the front face of the sensor chip 100 on the 1st heat-resistant-resin sheet 2, it gets down, and bonding of the pad 100b is carried out to the leadframe 5 by the wire 4. In addition, this pad 100b is the same as that of pad 1b shown in above-mentioned drawing 1 etc.

[0042] Moreover, the 2nd heat-resistant-resin sheet 102 is formed in the rear face of the sensor chip 100 as a rear-face protective cap for protecting beam structure 100a. This 2nd heat-resistant-resin sheet 102 demonstrates adhesive strength by making it heat and soften, and has pasted it up on the rear face of the sensor chip 100. The 2nd heat-resistant-resin sheet 102 is covered with the abbreviation whole region of the rear face of the sensor chip 100 so that beam structure 100a may be protected.

[0043] These [1st], the 2nd heat-resistant-resin sheet 2,102, and the heat-resistant adhesives 3 have the same thermal resistance as the heat-resistant-resin sheet and the heat-resistant adhesives which were stated with the above-mentioned 1st operation gestalt, and, similarly the above-mentioned polyimide base material, the above-mentioned silicone binder, or polyimide adhesives can specifically be used for them. And the sensor chip 100 is being fixed by pasting up the 2nd heat-resistant-resin sheet 102 on a leadframe 5, and the mould of the whole is carried out by the resin 7.

[0044] Here, the polyimide film adhesive which will soften if it heats, and turns into adhesives is sufficient as the 2nd heat-resistant-resin sheet 102. Next, the manufacture method of an acceleration sensor shown in drawing 9 is explained. The manufacturing process is shown in drawing 10 . These manufacture methods are the differences with using a double-sided exposure type semiconductor chip to the manufacture method of the 1st operation gestalt shown in above-mentioned drawing 2 , and main forming the heat-resistant-resin sheet 102 of a wrap 2nd for the rear-face side of this chip.

[0045] At the process of drawing 10 (a), the semiconductor wafer 110 with which beam structure 100a exposed to the front face and the rear face and pad 100b of aluminum (aluminum) were formed is prepared. The flat-surface composition of the semiconductor wafer 110 is shown in drawing 11 . As shown in drawing, beam structure 100a is formed in the position of each sensor chip, and alignment key 100c is further formed of aluminum for alignment with the heat-resistant pressure sensitive adhesive sheet 20. In addition, pad 100b omits to this drawing 11 , and is illustrated.

[0046] In the process of drawing 10 (b), that by which crevice 20a, contact hole 20b, and alignment key 20c were formed in the heat-resistant pressure sensitive adhesive sheet 20 which applied the heat-resistant adhesives 3 which consist of a silicone binder on the 1st heat-resistant-resin sheet 2 which consists of a polyimide base material obtained according to above-mentioned drawing 2 (a) and the process of (b) is stuck on the front face of the semiconductor wafer 110 in the same point as the process of above-mentioned drawing 2 (c). In this way, the 1st heat-resistant-resin sheet 2 is stuck on the front face of semiconductor wafer 110a using the heat-resistant adhesives 3.

[0047] Next, at the process of drawing 10 (c), heat the 2nd heat-resistant-resin sheet 102 which consists the rear face of the semiconductor wafer 110 of a polyimide base material which has the size of only a wrap, and it is made to soften, and sticks on the rear face of the semiconductor wafer 110. Here, since beam structure (sensing section) 100a is protected by the heat-resistant pressure sensitive adhesive sheet 20, the front face of a wafer 110 can make a wafer 110 inside-out, and can stick it easily.

[0048] Next, at the process of drawing 10 (d), a dicing cut is carried out and the semiconductor wafer 110 with which the 1st and 2nd heat-resistant-resin sheets 2,102 were stuck is chip-ized. This process can be performed in the same way as the process of above-mentioned drawing 2 (e). The state where use the dicing blade 8 for drawing 12 , and the dicing cut is performed to it is

shown. Then, as the sensor chip 100 chip-ized by the dicing cut is shown in drawing 9 , heat the 2nd heat-resistant-resin sheet 102, and it is made to soften, and after carrying out bonding of pad 100b and the leadframe 5 to a leadframe 5 with a wire 4 further by carrying out adhesion fixation, a mould is carried out by the resin 7 and a semiconductor acceleration sensor is completed.

[0049] Although about 180 degrees C needs to be heat-treated, and about 150 degrees C needs to be heat-treated at the time of bonding with a wire 4 and about 180 degrees C still needs to be heat-treated in the above-mentioned manufacture method at the time of a resin mould when the sensor chip 100 is fixed on a leadframe 5 Since the heat-resistant temperature of the polyimide base material which the configuration of the heat-resistant pressure sensitive adhesive sheet 20 has been maintained, and is the 2nd heat-resistant-resin sheet 102 like the above-mentioned 1st operation form is about 400 degrees C, A semiconductor acceleration sensor can be completed with the configuration of the heat-resistant-resin sheet 102 maintained.

[0050] Moreover, in this operation gestalt, since the leadframe 5 is pasted with the 2nd heat-resistant-resin sheet 102, in case structure 100a by the side of the rear face of the sensor chip 100 carries out die mounting of the chip 100 at a leadframe 5, its adhesives are unnecessary, adhesives crawl on it, and the problem of a riser of it is lost. Moreover, by mediation of the 2nd heat-resistant-resin sheet 102, a resin 7 can adhere to beam structure 100a from the rear face of a chip 100 in the case of a resin mould, or it can prevent invading from the crevice for jointing between the rear faces of a chip 100, and creeping up to beam structure 100a.

[0051] Moreover, in this operation gestalt, since the polyimide base material is used as a heat-resistant-resin sheet 2,102 and a polyimide base material has transparency, each sheet 2,102 is spaced, the movable electrode and fixed electrode of beam structure 100a can be checked, and a visual inspection becomes possible in the state [having attached the sheet, i.e., a protective cap,].

(The 6th operation gestalt) The another manufacture method of the semiconductor acceleration sensor shown in above-mentioned drawing 9 is shown in drawing 13 . These manufacture methods are the differences with using a double-sided exposure type semiconductor chip to the manufacture method (referring to drawing 6) shown in the above-mentioned 2nd operation gestalt, and main forming the heat-resistant-resin sheet 102 of a wrap 2nd for the rear-face side of this chip.

[0052] First, at the process of drawing 13 (a), the heat-resistant pressure sensitive adhesive sheet 20 in which crevice 20a obtained according to above-mentioned drawing 6 (a) and the process of (b) was formed is stuck on the front face of the semiconductor wafer 110. The point is the same as that of the process of above-mentioned drawing 6 (c). Next, at the process of drawing 13 (b), like above-mentioned drawing 6 (d), in order to carry out wirebonding, contact hole 20b is opened on pad 100b.

[0053] Next, at the process of drawing 13 (c), the 2nd heat-resistant-resin sheet 102 is stuck on the rear face of the semiconductor wafer 100 like the process of drawing 10 (c) stated with the above-mentioned 5th operation gestalt. After this, like the 5th operation gestalt, a dicing cut is performed and chip-ized and the semiconductor acceleration sensor finally shown in drawing 9 is completed. Also in this operation gestalt, the same effect as the above-mentioned 5th operation gestalt is done so.

(The 7th operation gestalt) the [of the semiconductor acceleration sensor shown in drawing 9 / the above 5th and] -- 6 operation gestalten show the different manufacture method to drawing 14 These manufacture methods are the differences with using a double-sided exposure type semiconductor chip to the manufacture method (referring to drawing 7) shown in the above-mentioned 3rd operation gestalt, and main forming the heat-resistant-resin sheet 102 of a wrap 2nd for the rear-face side of this chip.

[0054] First, at the process of drawing 14 (a), the heat-resistant pressure sensitive adhesive sheet 22 obtained according to the process of above-mentioned drawing 7 (a), (b), and (c) is stuck on the front face of the semiconductor wafer 110. The point is the same as that of the process of above-mentioned drawing 7 (d). In addition, heat-resistant-resin sheet 2' in the heat-resistant pressure sensitive adhesive sheet 22 is equivalent to 1st heat-resistant-resin sheet 2' with this operation gestalt.

[0055] Next, at the process of drawing 14 (b), the 2nd heat-resistant-resin sheet 102 is stuck on the rear face of the semiconductor wafer 100 like the process of drawing 10 (c) stated with the above-mentioned 5th operation gestalt. After this, like the 5th operation gestalt, a dicing cut is performed and chip-ized (refer to drawing 14 (c)), and the semiconductor acceleration sensor finally shown in drawing 9 is completed. Also in this operation gestalt, the same effect as the above-mentioned 5th operation gestalt is done so.

(Octavus operation gestalt) This operation gestalt is the modification which is not a resin mould, carried out receipt fixation of the sensor chip 100 in the semiconductor acceleration sensor shown in drawing 9 into the ceramic package, constituted, and applied the double-sided exposure type sensor chip 100 to the above-mentioned 4th operation gestalt. The cross-section composition of the semiconductor acceleration sensor of this operation gestalt is shown in drawing 15 .

[0056] The composition of the portion of the sensor chip 100 with which beam structure 100a was protected by the 1st and 2nd heat-resistant-resin sheets 2,102 is the same as what is shown in above-mentioned drawing 9 . The sensor chip 100 is contained in the crevice in the package book soma 30, and is being fixed by pasting up the internal surface of this crevice, and the 2nd heat-resistant-resin sheet 102.

[0057] Thus, it sets in the semiconductor acceleration sensor of composition of that the ceramic package was carried out. When the sensor chip 100 is fixed in the package book soma 30, about 180 degrees C needs to be heat-treated. Moreover, although about 150 degrees C needs to be heat-treated at the time of bonding with a wire 4, and about 180 degrees C needs to be heat-treated when a covering device 32 is further fixed to the ceramic book soma 30 with adhesives 33 Since the heat-resistant temperature of the polyimide base material which is the heat-resistant-resin sheet 2,102, and the silicone binder which is the heat-resistant adhesives 3 is higher than the maximum temperature of the above-mentioned heat treatment temperature also in this operation gestalt, A semiconductor acceleration sensor can be completed with the configuration of both the heat-resistant-resins

sheet 2,102 maintained.
[0058] And also in this operation gestalt, with the 2nd heat-resistant-resin sheet 102, adhesives crawl and the problem of a riser is lost. In addition, also in this operation gestalt, the manufacture method of a heat-resistant-resin sheet and its composition can apply the above-mentioned thing of the 6th and the 7th operation gestalt. Moreover, thermal resistance can be raised if it is the thing of the molecular structure which has a silanol group (Si-OH) as silicone adhesives. And you may use polyimide adhesives instead of a silicone binder.
[0059] Moreover, you may paste up the 2nd heat-resistant adhesives 102 on the rear face of the semiconductor wafer 110 with the same heat-resistant adhesives as the heat-resistant adhesives 3. Moreover, you may also perform adhesion with the crevice in the 2nd heat-resistant-resin sheet 102, leadframe 5, and package book soma 30 through heat-resistant adhesives. in this case, these heat-resistant adhesives -- creeping up -- it can prevent by mediation of the 2nd heat-resistant-resin sheet 102
[0060] Furthermore, a mechanical strength can apply this invention similarly to the semiconductor device which has the low structure not only like a sensor element but like the air bridge wiring structure of having moving part, such as the beam structure.

[Translation done.]

* NOTICES *

TECHNICAL FIELD

[The technical field to which invention belongs] this invention relates to the semiconductor device with which it comes to cover the structure by the protective cap, and its manufacture method in the semiconductor chip which has the structure which consisted of semiconductors.

[Translation done.]

CLAIMS

[Claim(s)]

[Claim 1] The semiconductor device with which it has the following, bonding of the aforementioned pad (1b) exposed by the aforementioned opening (20b, 20e) is carried out by the wire (4), and the aforementioned heat-resistant-resin sheet (2 2') and the aforementioned heat-resistant adhesives (3) are characterized by having the thermal resistance more than the heat treatment temperature when performing the aforementioned bonding. The semiconductor chip which has the structure (1a) which consisted of semiconductors and by which the pad (1b) for carrying out electrical connection to the exterior was formed in the front face (1) The heat-resistant-resin sheet pasted up with heat-resistant adhesives (3) on the aforementioned semiconductor chip so that it might have opening (20b, 20e) for exposing the aforementioned pad (1b) and the aforementioned structure (1a) might be covered (2 2')

[Claim 2] It is the semiconductor device which comes to carry out the resin mould of the semiconductor chip (1) in which the protective cap was formed. The aforementioned protective cap is constituted by the heat-resistant-resin sheet (2 2'). The aforementioned heat-resistant-resin sheet (2 2') has pasted up on the aforementioned semiconductor chip (1) with heat-resistant adhesives (3). The semiconductor device with which the aforementioned heat-resistant-resin sheet (2 2') and the aforementioned heat-resistant adhesives (3) are characterized by having the thermal resistance more than the heat treatment temperature needed when carrying out the resin mould of the aforementioned semiconductor chip (1).

[Claim 3] The semiconductor device which is equipped with the following and characterized by to have the thermal resistance more than the highest temperature among the heat treatment temperature when performing the heat treatment temperature and the aforementioned resin mould when fixing to the aforementioned leadframe (5) heat treatment temperature in case it is the semiconductor device which comes to carry out a mould and the aforementioned heat-resistant-resin sheet (2 2') and the aforementioned heat-resistant adhesives (3) perform the aforementioned bonding with a resin (7), and the aforementioned semiconductor chip (1). The semiconductor chip which has the structure (1a) which consisted of semiconductors and by which the pad (1b) for carrying out electrical connection to the exterior was formed in the front face (1) The heat-resistant-resin sheet pasted up with heat-resistant adhesives (3) on the aforementioned semiconductor chip (1) so that it might have opening (20b, 20e) for exposing the aforementioned pad (1b) and the aforementioned structure (1a) might be covered (2 2') The leadframe which fixes the aforementioned semiconductor chip (1) (5) The wire which carries out bonding of the aforementioned leadframe (5) to the aforementioned pad (1b) exposed by the aforementioned opening (20b, 20e) (4)

[Claim 4] It is the semiconductor device which comes to contain the semiconductor chip (1) in which the protective cap was formed in a package (30-33). The aforementioned protective cap is constituted by the heat-resistant-resin sheet (2 2'). The aforementioned heat-resistant-resin sheet (2 2') has pasted up on the aforementioned semiconductor chip (1) with heat-resistant adhesives (3). The semiconductor device with which the aforementioned heat-resistant-resin sheet (2 2') and the aforementioned heat-resistant adhesives (3) are characterized by having the thermal resistance more than the heat treatment temperature needed when containing the aforementioned semiconductor chip (1) into the aforementioned package (30-33).

[Claim 5] The semiconductor chip which has the structure (1a) which consisted of semiconductors and by which the pad (1b) for carrying out electrical connection to the exterior was formed in the front face (1) The heat-resistant-resin sheet pasted up with heat-resistant adhesives (3) on the aforementioned semiconductor chip (1) so that it might have opening (20b, 20e) for exposing the aforementioned pad (1b) and the aforementioned structure (1a) might be covered (2 2') The package book soma which has the electrical connecting means (31) for carrying out receipt fixation of the aforementioned semiconductor chip (1), and carrying out electrical connection to the exterior (30) The wire which carries out bonding of the aforementioned electrical connecting means (31) to the aforementioned pad (1b) exposed by the aforementioned opening (20b, 20e) (4) The covering device by which adhesion fixation is carried out at the aforementioned package book soma (30) (32) It is the semiconductor device equipped with the above, and it carries out having the thermal resistance more than the highest temperature among the heat treatment temperature when carrying out adhesion fixation to the aforementioned package book soma (30) in heat treatment temperature and the aforementioned covering device (32) in case the aforementioned heat-resistant-resin sheet (2 2') and the aforementioned heat-resistant adhesives (3) carry out receipt fixation of the heat treatment temperature when performing the aforementioned bonding, and the aforementioned semiconductor chip (1) at the aforementioned package book soma (30) as the feature.

[Claim 6] The claim 1 to which the aforementioned heat-resistant-resin sheet (2 2') is characterized by being constituted using a polyimide base material, or the semiconductor device of any one publication of five.

[Claim 7] The claim 1 characterized by using the silicone binder as the aforementioned heat-resistant binder (3), or the

semiconductor device of any one publication of six.
[Claim 8] The manufacture method of a semiconductor device characterized by providing the following. The process which prepares the semiconductor wafer (10) with which it has the structure (1a) which consisted of semiconductors, and the pad (1b) for carrying out electrical connection to the exterior was formed in the front face. The process which sticks the heat-resistant-resin sheet (2 2') which has the crevice (20a, 20c) of a wrap sake for the aforementioned structure (1a) on the aforementioned semiconductor wafer (10) using a heat-resistant binder (3). The process which forms opening (20b, 20d) for exposing the aforementioned pad (1b) on the aforementioned heat-resistant-resin sheet (2 2'). The process which carries out a dicing cut and chip-izes the aforementioned semiconductor wafer (10) with which the aforementioned heat-resistant-resin sheet (2 2') was stuck, and the process which carries out bonding of the aforementioned pad (1b) exposed in the semiconductor chip (1) obtained by the aforementioned dicing cut by the aforementioned opening (20b, 20e) of the aforementioned heat-resistant-resin sheet (2 2') with a wire (4).
[Claim 9] The manufacture method of a semiconductor device characterized by providing the following. The process which prepares the semiconductor wafer (10) which has the structure (1a) which consisted of semiconductors. The process which sticks the heat-resistant-resin sheet (2 2') which has the crevice (20a, 20c) of a wrap sake for the aforementioned structure (1a) on the aforementioned semiconductor wafer (10) using a heat-resistant binder (3). The process which carries out a dicing cut and chip-izes the aforementioned semiconductor wafer (10) with which the aforementioned heat-resistant-resin sheet (2 2') was stuck. The process which carries out the resin mould of the semiconductor chip (1) obtained by the aforementioned dicing cut, with the aforementioned heat-resistant-resin sheet (2 2') left.
[Claim 10] The manufacture method of a semiconductor device characterized by providing the following. The process which prepares the semiconductor wafer (10) which has the structure (1a) which consisted of semiconductors. The process which sticks the heat-resistant-resin sheet (2 2') which has the crevice (20a, 20c) of a wrap sake for the aforementioned structure (1a) on the aforementioned semiconductor wafer (10) using a heat-resistant binder (3). The process which carries out a dicing cut and chip-izes the aforementioned semiconductor wafer (10) with which the aforementioned heat-resistant-resin sheet (2 2') was stuck. The process which carries out receipt fixation of the semiconductor chip (1) obtained by the aforementioned dicing cut into a package (30-33), with the aforementioned heat-resistant sheet (2 2') left.
[Claim 11] Have the following and the aforementioned semiconductor chip is being fixed by pasting up the heat-resistant-resin sheet of the above 2nd on the aforementioned leadframe. The aforementioned pad exposed by the aforementioned opening and the aforementioned leadframe Bonding is carried out by the wire (4). the above 1st, the 2nd heat-resistant-resin sheet, and the aforementioned heat-resistant adhesives The semiconductor device characterized by having the thermal resistance more than the highest temperature among the heat treatment temperature when fixing the heat treatment temperature and the aforementioned semiconductor chip when performing the aforementioned bonding to the aforementioned leadframe. The semiconductor chip which has the structure (100a) which semiconductors were consisted of and was exposed to the front face and the rear face and by which the pad (100b) for carrying out electrical connection to the exterior was formed in the front face (100) The 1st heat-resistant-resin sheet pasted up on the front face of the aforementioned semiconductor chip with heat-resistant adhesives (3) so that it might have opening (20b, 20e) for exposing the aforementioned pad and the aforementioned structure might be covered (2 2') The 2nd heat-resistant-resin sheet pasted up on the rear face of the aforementioned semiconductor chip so that the aforementioned structure might be covered (102) The leadframe which fixes the aforementioned semiconductor chip (5)
[Claim 12] It is the semiconductor device characterized [have / the following] by the above 1st, the 2nd heat-resistant-resin sheet, and the aforementioned heat-resistant adhesives having the thermal resistance more than the heat treatment temperature needed when performing the mould of the aforementioned resin by carrying out the mould of the aforementioned semiconductor chip, the above 1st, and the 2nd heat-resistant-resin sheet by the resin (7). The semiconductor chip which has the structure (100a) which semiconductors were consisted of and was exposed to the front face and the rear face (100) The 1st heat-resistant-resin sheet pasted up on the front face of the aforementioned semiconductor chip with heat-resistant adhesives (3) so that the aforementioned structure might be covered (2 2') The 2nd heat-resistant-resin sheet pasted up on the rear face of the aforementioned semiconductor chip so that the aforementioned structure might be covered (102)
[Claim 13] It is the semiconductor device which is equipped with the following and characterized by the above 1st, the 2nd heat-resistant-resin sheet, and the aforementioned heat-resistant adhesives having the thermal resistance more than the heat treatment temperature when fixing the aforementioned semiconductor chip to the aforementioned package by fixing the aforementioned semiconductor chip to the interior of the aforementioned package by pasting up the heat-resistant-resin sheet of the above 2nd on the aforementioned package. The semiconductor chip which has the structure (100a) which semiconductors were consisted of and was exposed to the front face and the rear face (100) The 1st heat-resistant-resin sheet pasted up on the front face of the aforementioned semiconductor chip with heat-resistant adhesives (3) so that the aforementioned structure might be covered (2 2') The 2nd heat-resistant-resin sheet pasted up on the rear face of the aforementioned semiconductor chip so that the aforementioned structure might be covered (102) The package which contains the aforementioned semiconductor chip (30-33)
[Claim 14] The claim 11 to which either the above 1st and the 2nd heat-resistant-resin sheet (2, 2', 102) are characterized by the bird clapper from a transparent material, or the semiconductor device of any one publication of 13.
[Claim 15] The claim 11 to which the above 1st and the 2nd heat-resistant-resin sheet (2, 2', 102) are characterized by being constituted using a polyimide base material, or the semiconductor device of any one publication of 14.
[Claim 16] The heat-resistant-resin sheet (102) of the above 2nd is the claim 11 characterized by having pasted the rear face of

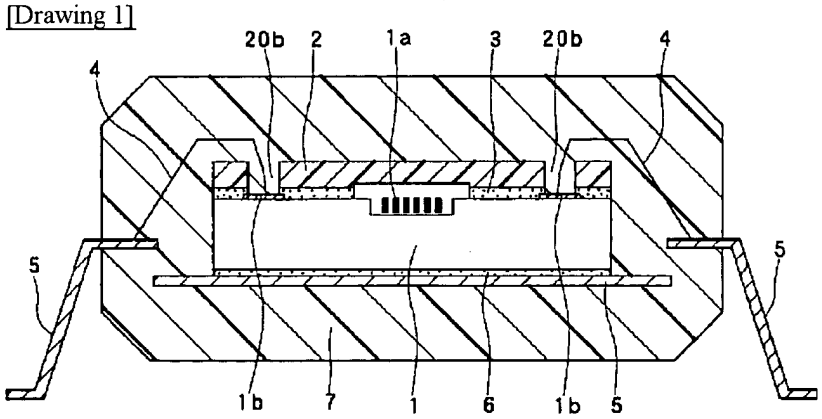
the aforementioned semiconductor chip (100) with heat-resistant adhesives (103), or the semiconductor device of any one publication of 15.
[Claim 17] The claim 11 characterized by using the silicone binder as the aforementioned heat-resistant binder (3,103), or the semiconductor device of any one publication of 16.
[Claim 18] The manufacture method of a semiconductor device characterized by providing the following. The process which prepares the semiconductor wafer (110) with which it has the structure (100a) which semiconductors were consisted of and was exposed to the front face and the rear face, and the pad (100b) for carrying out electrical connection to the exterior was formed in the front face. The process which sticks the 1st heat-resistant-resin sheet (2 2') which has the crevice (20a, 20c) of a wrap sake for the aforementioned structure on the front face of the aforementioned semiconductor wafer using heat-resistant adhesives (3). The process which forms opening (20b, 20d) for exposing the aforementioned pad on the heat-resistant-resin sheet of the above 1st. The process which sticks the 2nd heat-resistant-resin sheet (102) of a wrap sake for the rear face of the aforementioned structure on the rear face of the aforementioned semiconductor wafer, The process which carries out a dicing cut and chip-izes the aforementioned semiconductor wafer with which the above 1st and the 2nd heat-resistant-resin sheet were stuck, The process which fixes the semiconductor chip obtained by the aforementioned dicing cut by pasting up the heat-resistant-resin sheet of the above 2nd on the aforementioned leadframe, The process which carries out bonding of the aforementioned pad exposed by the aforementioned opening of the heat-resistant-resin sheet of the above 1st in the semiconductor chip fixed to the aforementioned leadframe, and the aforementioned leadframe with a wire.
[Claim 19] The manufacture method of a semiconductor device characterized by providing the following. The process which prepares the semiconductor wafer (110) which has the structure (100a) which semiconductors were consisted of and was exposed to the front face and the rear face. The process which sticks the 1st heat-resistant-resin sheet (2 2') which has the crevice (20a, 20c) of a wrap sake for the aforementioned structure on the front face of the aforementioned semiconductor wafer using heat-resistant adhesives (3). The process which sticks the 2nd heat-resistant-resin sheet (102) of a wrap sake for the rear face of the aforementioned structure on the rear face of the aforementioned semiconductor wafer. The process which carries out a dicing cut and chip-izes the aforementioned semiconductor wafer with which the above 1st and the 2nd heat-resistant-resin sheet were stuck, and the process which carries out the resin mould of the semiconductor chip obtained by the aforementioned dicing cut, with the above 1st and the 2nd heat-resistant-resin sheet left.
[Claim 20] The manufacture method of a semiconductor device characterized by providing the following. The process which prepares the semiconductor wafer (110) which has the structure (100a) which semiconductors were consisted of and was exposed to the front face and the rear face. The process which sticks the 1st heat-resistant-resin sheet (2 2') which has the crevice (20a, 20c) of a wrap sake for the aforementioned structure on the front face of the aforementioned semiconductor wafer using heat-resistant adhesives (3). The process which sticks the 2nd heat-resistant-resin sheet (102) of a wrap sake for the rear face of the aforementioned structure on the rear face of the aforementioned semiconductor wafer. The process fix to the aforementioned package by pasting up the heat-resistant-resin sheet of the above 2nd to the aforementioned package while containing the process which carries out a dicing cut and chip-izes the aforementioned semiconductor wafer with which the above 1st and the 2nd heat-resistant-resin sheet were stuck, and the semiconductor chip obtained by the aforementioned dicing cut in a package (30-33), with the above 1st and the 2nd heat-resistant-resin sheet left.

[Translation done.]

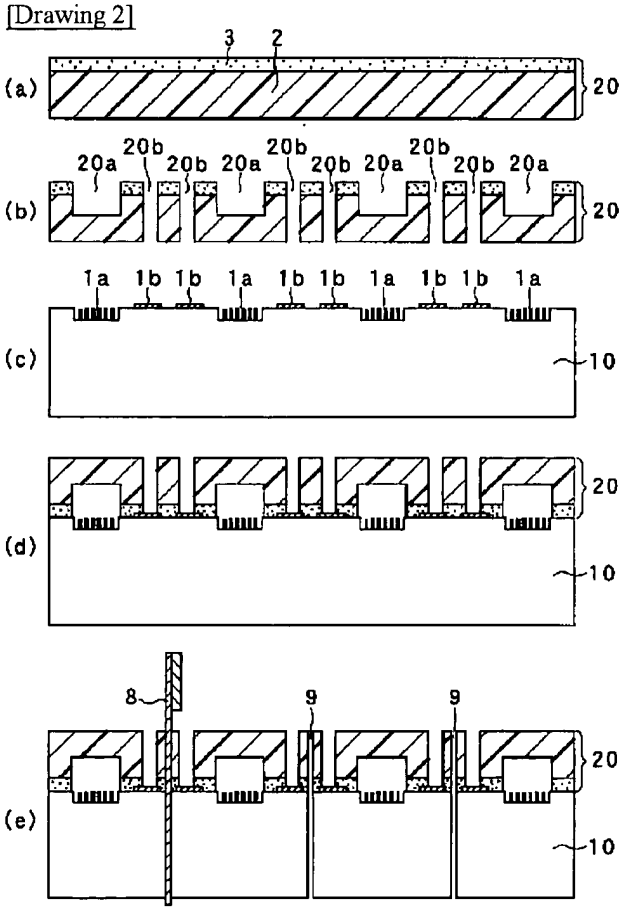
* NOTICES *

DRAWINGS

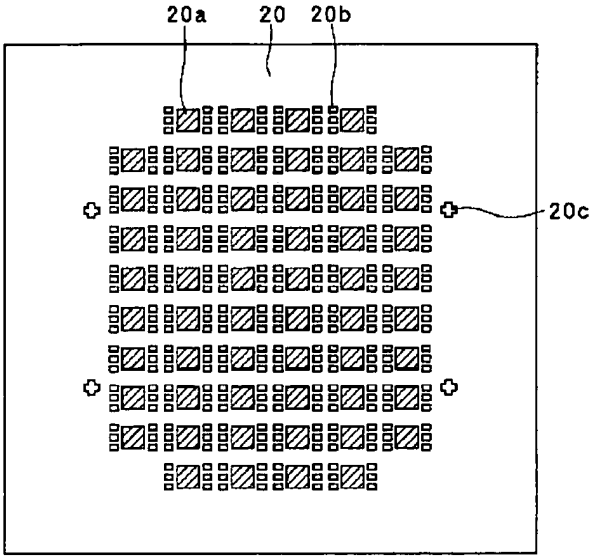
[Drawing 1]



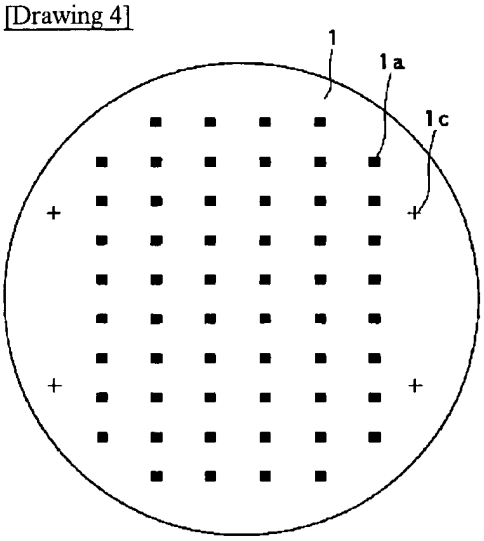
[Drawing 2]



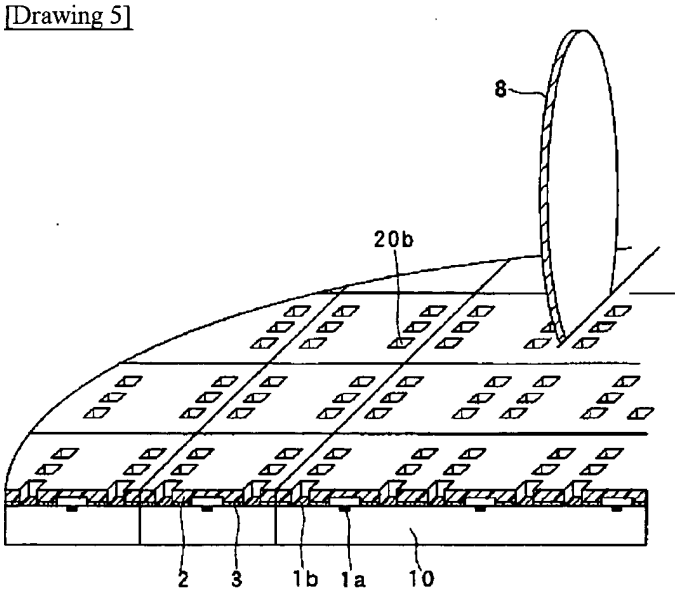
[Drawing 3]



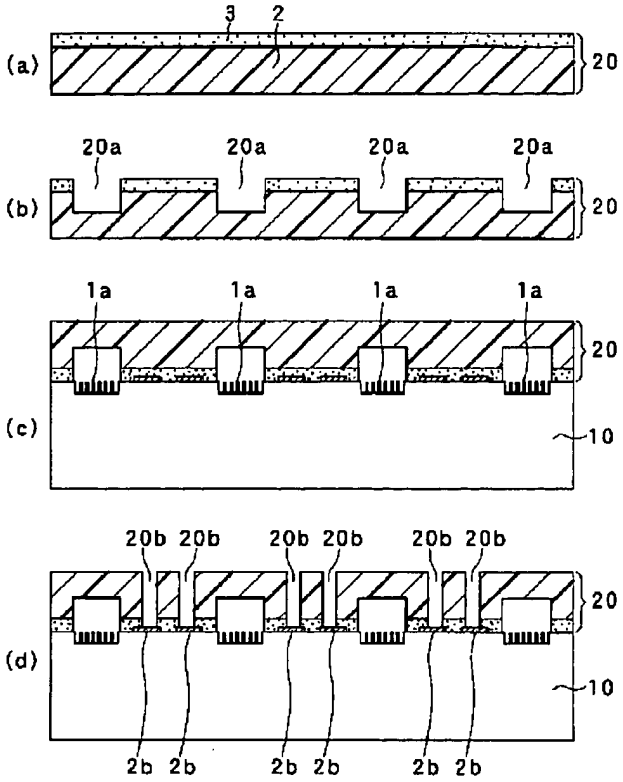
[Drawing 4]



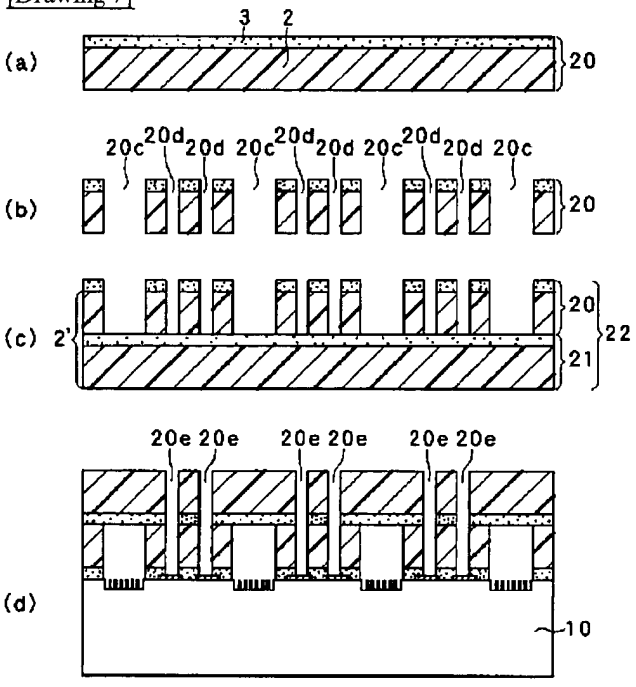
[Drawing 5]



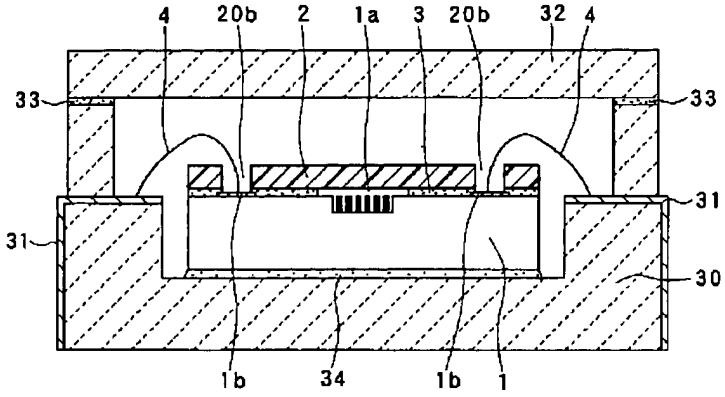
[Drawing 6]



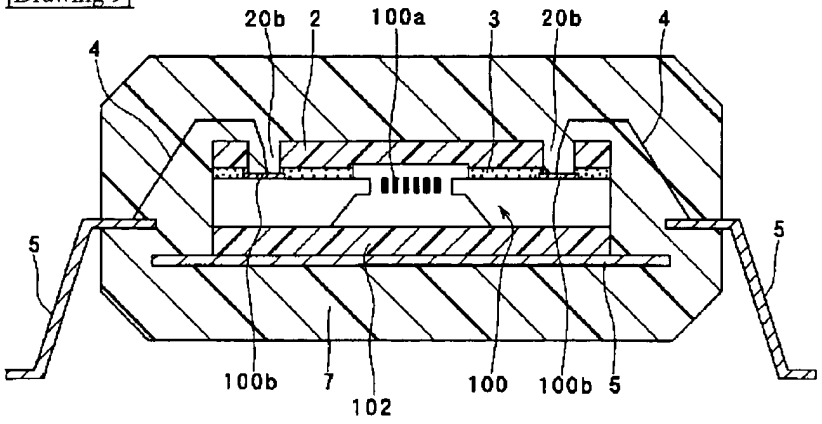
[Drawing 7]



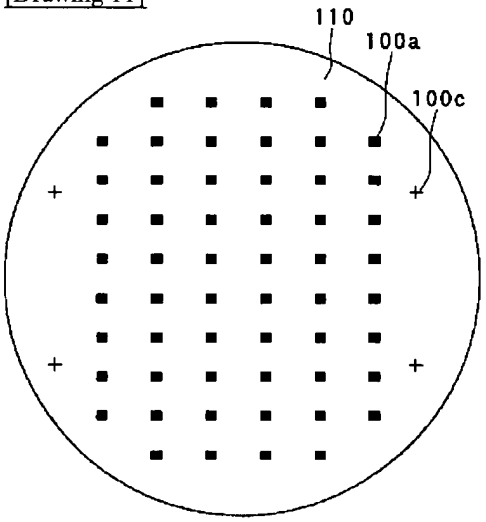
[Drawing 8]



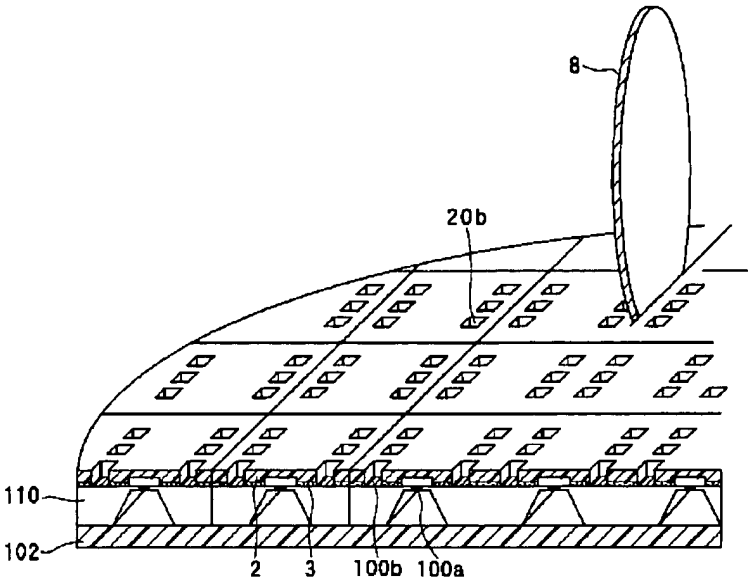
[Drawing 9]



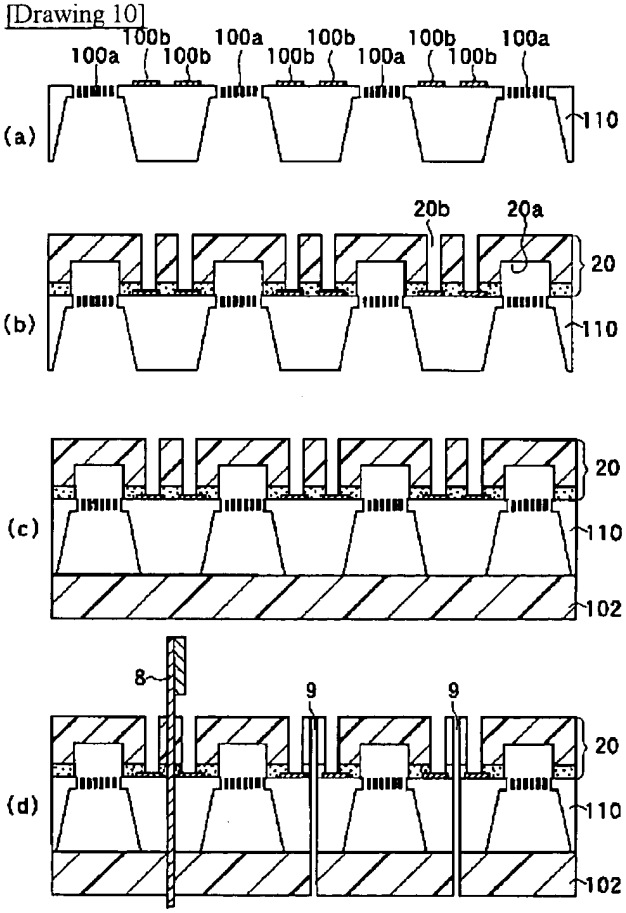
[Drawing 11]



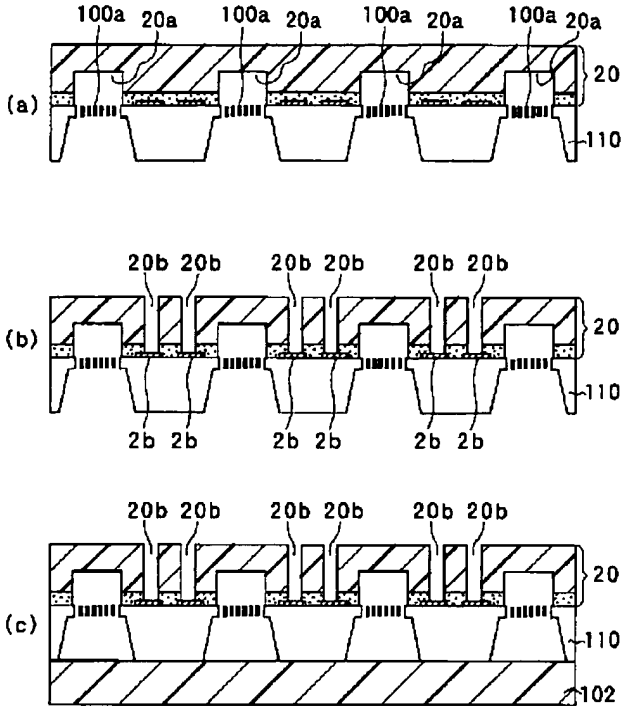
[Drawing 12]



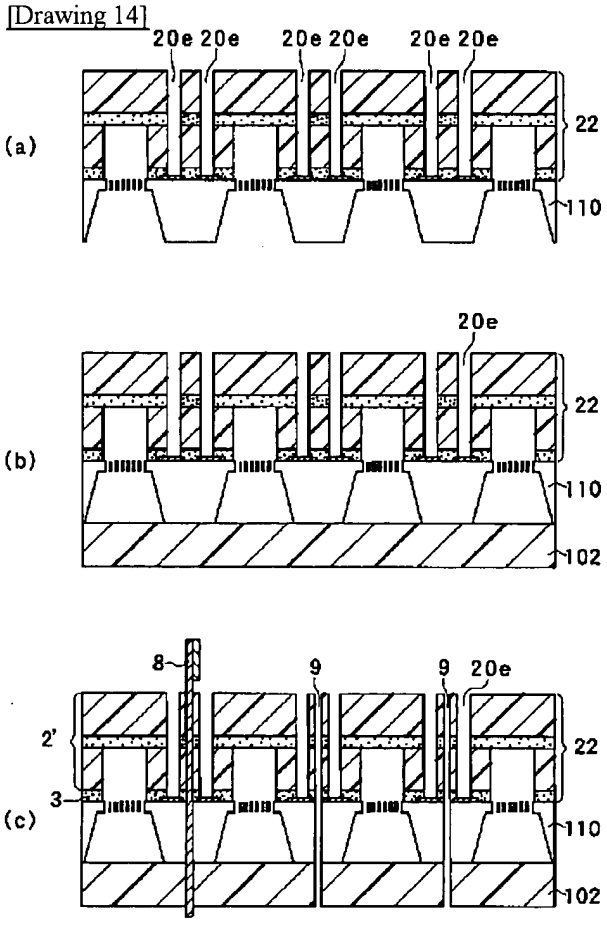
[Drawing 10]



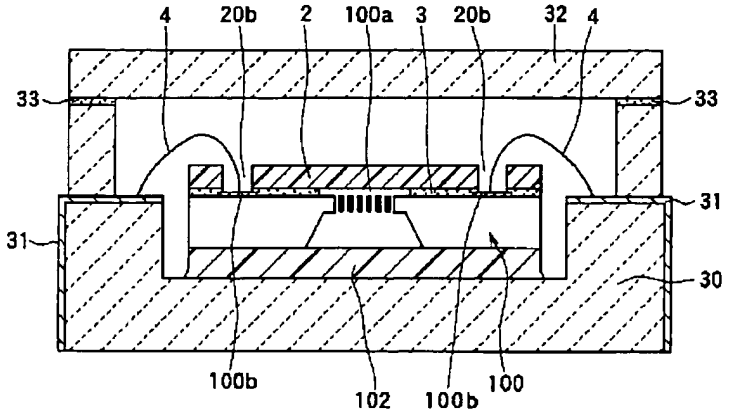
[Drawing 13]



[Drawing 14]



[Drawing 15]



[Translation done.]